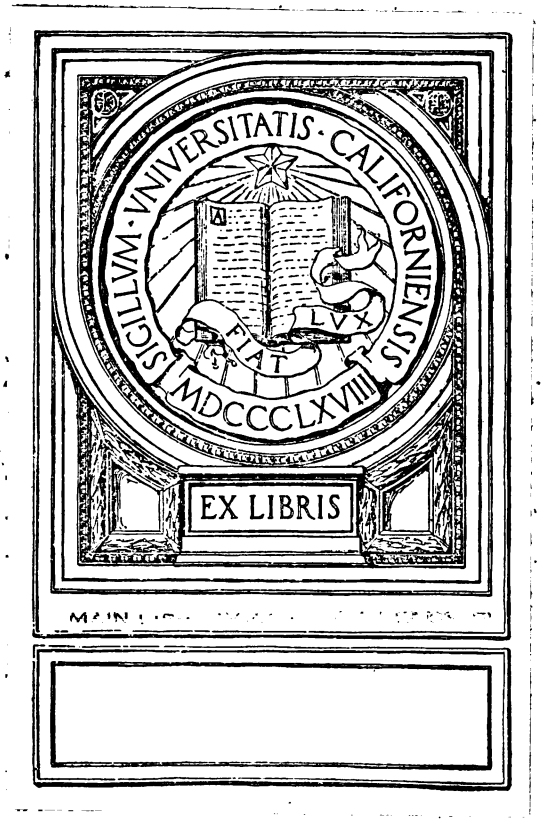
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OFFICIAL PROCEEDINGS

OF THE

February, 1910, Meeting

OF THE

Oregon State Board of Forestry

Including Forest Fire Report for 1909, and Committee Report on Insect Depredations

SALEM, OREGON
WILLIS S. DUNIWAY, STATE PRINTER
1910

PROCEEDINGS OF THE FEBRUARY MEETING OF THE STATE BOARD OF FORESTRY

A called meeting of the State Board of Forestry was held February 7, 1910, at 11:30 A. M., in the Governor's chambers at Salem, Oregon. There were present F. W. Benson, chairman, Salem; R. W. Stevenson, Forest Grove; H. C. McAllister, Salem; S. C. Bartrum, Roseburg; L. S. Hill, Cottage Grove, and A. B. Wastell, secretary, Portland.

The chairman stated that if there were no objections the reading of the minutes of the last meeting would be dispensed with.

The only absent member of the Board was E. R. Lake, of Corvallis, and the secretary reported his understanding that Mr. Lake had been given a leave of absence from the Oregon Agricultural College to take up special work of the Department of Agriculture of the Federal Government, requiring his absence from the State for a period of one year, and that Mr. G. W. Peavy had been appointed to succeed Mr. Lake at Corvallis. The secretary was instructed to communicate with Mr. Lake and suggest that inasmuch as his absence would lap into another appointive term it would be advantageous to the State Board if he would arrange so that Mr. Peavy, by virtue of his position at the Agricultural College, could be appointed an active member of the State Board of Forestry as authorized by the act creating the Board.

The secretary then presented his report, as follows:

REPORT OF SECRETARY.

Since having assumed the secretaryship of the Oregon State Board of Forestry, August 31, 1909, by appointment of the Governor, vice Edwin P. Sheldon resigned, we have endeavored to handle the duties of the office with due regard to its importance, and at this meeting called by the Governor to review the work of the past fire season which closed September 30, 1909, we beg to report as follows:

We are impressed with the tremendous importance of the forests of the State of Oregon which comprises one-sixth of the standing timber of the United States, and in reviewing the forestry situation we realize the important duty resting on this Board in relation to husbanding and safeguarding in every way possible the forest resources of the State.

In reviewing the situation we find, in addition to the State Board of Forestry, that other agencies are also at work

striving to perpetuate and preserve the natural resources of this commonwealth, namely, the Oregon State Conservation Commission, a sister board, created by legislative enactment at the last session, as well as two voluntary associations, termed the Oregon Conservation Association and the Oregon Forestry Association, each comprised of popular membership, the latter being an organization of women who have taken up this important work. You will observe that two of these organizations have for their object the conservation of all natural resources, while the State Board of Forestry and the Oregon Forestry Association are distinctly organized for the purpose of perpetuating the forest resources.

It has been the pleasure of this Board to exist harmoniously with these other organizations, and considerable advantage has been gained through such co-operation.

If the State Board of Forestry was maintained with proper financial backing this Board would properly assume the executive and administrative needs of forestry development, while the publicity feature would be taken care of by the other organizations; this would be the ideal relation which should exist. The duty of this Board would be to supervise the patrolling and policing of the forests of the State through the services of competent state fire wardens directed by a state forester. On account, however, of the inadequate appropriation the work of this Board is also confined to the publicity feature, and even in this direction we are limited by a $500 appropriation to cover two years' requirements, which by the act is designed only for services of stenographer and postage, so that funds are not adequate to furnish fire wardens, who serve without pay, the postage to send in the monthly fire reports requested of them or letters in connection with their work, nor to distribute often or widely printed publicity matter. The act creating the Board, however, gives the privilege of unlimited printing by the State Printer.

Upon receipt of an offer in June, 1909, from the Oregon Conservation Association to furnish copy and pay for the distribution of publicity matter, if printing would be undertaken by this Board, such authorization was approved and requisition made on the State Printer to print 60,000 leaflets and 15,000 posters, cautioning the public to exercise care and to prevent forest fires, which were distributed by the Conservation Association during the past season, with excellent results.

Thirty thousand of these leaflets were distributed by the 1,000 fire wardens who were enrolled by the State during the past fire season, 3,000 leaflets by the Harriman lines, 1,000 leaflets by the Oregon Water Power Railway Company, 1,000 posters by postmasters, 5,000 leaflets and 2,000 posters

by the lumber manufacturers and loggers, several thousand leaflets by hardware stores when shipping ammunition to interior towns by enclosing several copies in each package of ammunition forwarded, as well as placing leaflets in packages delivered over their counters in Portland; 1,000 posters by the Harriman lines for use in stations, several thousand leaflets by the members of the Oregon Conservation Association by enclosing as inserts in their mail. There were also posted by the fire wardens of the State 3,000 cloth warning notices in new districts.

As indicated above, 1,000 citizens were enrolled as fire wardens during the past season. Of this number, 135 were paid fire wardens in the employ of the timber owners, 170 were in the employ of the forest service, in the national forests, while the remainder included 661 road supervisors and 34 sheriffs of the several timber counties who served last season as wardens without any compensation. Special credit should be given to these men, most of whom in cheerfully accepting the appointment stated that they would do what they could in connection with their regular duties, and they proved invaluable in distributing publicity matter which was sent them, and which, through this medium, has reached a large number of people in rural districts whom it would have been impossible to reach in any other way.

These men issued permits to set fires when, in their judgment, such action was warranted and when the applicants for permits were unable to reach the regular paid wardens on account of being in remote districts. Some adverse criticism has been made as to lack of judgment by road supervisors in issuing permits while acting as wardens, but we must grant that errors in judgment are possible in the best of us, and considering the large number of men who were given new responsibilities over such large areas, without either adequate instruction or supervision, also the benefit that was gained through awakening their personal interest and through them the interest of their neighbors, and by reason of more extended supervision of the forest area we feel that these advantages offset the few instances in which poor judgment was exercised.

During the 1908 season there were 280 fire wardens enrolled, while in the 1909 season 1,000 fire wardens were enrolled as previously detailed. Reports of fires occurring in the forests were not received as promptly or in as large numbers during the 1908 closed season, and through the receipt the past season of fire reports we were able in conjunction with the forest service to compile a very comprehensive report giving the record of fires in 1909.

This fire report for 1909 is filed herein as a part of this report.

STATE BOARD OF FORESTRY

REPORT OF FOREST FIRES IN THE STATE OF OREGON, 1909

(Total reported for State, including National Forests)

County	Number of fires	Area burned over			Merchantable timber destroyed			Improvements and live stock burned	Number human lives lost	Expenditures fighting and preventing fires		
		Merchantable timber—acres	Second growth not yet merchantable—acres	Cut-over lands—acres	Total acres	Board—feet	Loss in potential value if it had been manufactured			By State, county, or town	By individuals, lumber companies, etc.	By forest service
Baker	23	266.5	606	630	1,502.5	210,250	$ 2,733 25				$ 183 64	$
Benton	*										174 93	
Clackamas	11		1	490	491						225 00	
Clatsop	14	230	50	234	514	2,300,000	29,900 00				5,434 00	
Columbia	21	295	50	1,392	1,737	3,470,000	45,110 00				6,974 71	
Coos	8	630		321	951	3,075,000	39,975 00				5,241 25	
Crook	24	1,314	487		1,801	1,784,500	23,198 50				345 97	
Curry	8	2,012	72.5	1,285	3,299.5	5,500,000	23,500 00				126 12	
Douglas	49	2,265	790	30	3,085	9,500,000	31,500 00				1,145 70	
Gilliam	*											
Grant	16	1,189	175	6	1,370	387,000	5,031 00				148 84	
Harney	*											
Hood River	3		240	35	275						96 00	
Jackson	27	17,025	335	1,500	18,860	138,800,000	1,804,400 00				1,469 23	
Josephine	32	4,000	1,700		5,700	9,501,000	123,513 00				451 46	
Klamath	14	9			9	90,000	1,170 00				436 84	
Lake	8	8			8	44,840	582 92				8 15	
Lane	66	1,172	651	14,078	15,901	6,752,000	87,776 00				3,351 98	
Lincoln	2			100	100						55 00	
Linn	8	10		2	12	100,000	1,300 00				362 45	
Malheur	1	†										
Marion	5			81	81						801 63	
Morrow	*											
Multnomah	6	‡									410 00	
Polk	*						3,705 00				1,431 45	

Sherman	*												
Tillamook	8	28	20	28	76	285,000						4,667 06	
Umatilla	2	1	40		11								
Union	14	160		555	715	411,000	5,343 00					507 00	
Wallowa	7	274	20		294	231,000	8,008 00					15 00	
Wasco	11	1,580		850	2,430	3,652,000	47,476 00	1 house				120 00	
Washington	21	645	440	675	1,760	4,875,000	63,375 00					1,422 30	
Wheeler	*												
Yamhill	4	24			24	245,000	3,185 00					559 00	
Totals	413	33,137.5	5,607.5	22,292	61,037.0	191,213,590	$ 2,485,776 67	1 house				$36,164 71	$ 5,220 84

* No fires reported. † Area burned over and damage not given. ‡ Acreage and damage not given.

NOTE.—Expenditures fighting and preventing fires by individuals, lumber companies, etc., includes cost of patrol during the fire season, it being impossible to separate the time spent in actual fire fighting from that spent in patrol.

The figures naturally show less than actual expenditures, for the reason that all reports to the State Board of Forestry were voluntary, the State not furnishing any funds either for reporting or fighting fire.

This report shows that there were 413 fires, burning over an area of 61,037 acres, and that a total of 191,213,500 feet, board measure, of merchantable timber was destroyed. If this timber had been manufactured into lumber it would have represented an approximate value of $2,485,776.

Comparison with the State of Washington brings out some interesting and impressive facts. We find that Washington had 1,309 fires but only lost about 150,000,000 feet of standing timber, while Oregon lost nearly 200,000,000 feet with but one-third the number of fires.

It is admitted that the hazard in Washington was greatly increased on account of a very dry season; also, that a large proportion of Washington fires were caused by sparks from locomotives. In Oregon most of the locomotives are oil-burners, considerably reducing the fire hazard on this score, in addition to which we well know that our railroad mileage is far less than in Washington, which also reduces the hazard to the forests. Furthermore, considering the large number of fires and yet the comparatively small amount of timber destroyed in Washington, credit must be given to the effectiveness of the organized effort of private timber owners through the Washington Forest Fire Association, as well as to the State and Government, which participated so fully in this work. In Washington the State expended $15,705.24; individuals and lumber companies expended $34,308.52; while the forest service expended $11,710.80, making a total of $61,724.56. In Oregon no money was spent by the State in this direction. Individuals and lumber companies expended $36,164.71, while the forest service expended $5,220.84, making a total of $41,385.55. From the reports we also note that a few big fires in remote districts of Oregon continued burning for weeks, covering a large area, whereas in Washington the fires were subdued promptly through having fire fighting forces available. Oregon's lack of preparation would certainly have occasioned a tremendous loss if the season had been as dry and if as many fires had started in this State as in Washington.

We have received a great many suggestions from various sources during the past season which are worthy of consideration, and beg to submit such suggestions which seem to warrant our careful consideration.

"Berry-pickers are responsible for more fires than any other cause.

"The hunting season is responsible for a great many fires, through its opening during the close fire season when everything is dry, and when anybody who can raise a dollar for a license, and borrow an old shotgun, can trespass in the forests, whether of private or public ownership. These are the classes of people who give the most trouble, and it would be impossible to get wardens enough to watch them.

"Stock-raisers and homesteaders cause a great many fires east of the Cascade Mountains, and while we might congratulate ourselves on

the few fires reported, as a matter of fact in inaccessible districts large fires occasioning great loss raged during the past season.

"One of the greatest harms resulting from the fires in standing timber, is that the seedlings springing up are killed off by the fires running through the forests, older trees not being much damaged, but the loss of the new growth is irreparable.

"There is only one proper way to handle this thing, and that is to have an absolutely close season for three months, under which proposition no permits would be issued to any one to burn anything; until this is done, you will have the same condition that we are having now, namely, the people who have slashings will burn at the very driest and most dangerous season of the year, without regard for the resulting loss to adjoining timber owners, for whom the foothill ranchers have small regard."

It is our conclusion that fighting forest fires cannot be prosecuted successfully by private individuals without some sort of organization. It is impossible also to bring the power to bear to carry on the work, except as conveyed by the State. Under the conditions under which this Board operates the exercise of the police power must be extended to the employees of private timber owners who serve as state fire wardens and who have proven in the main faithful and to have used good discretion, but on account of being employed by timber owners in private capacity, they are looked upon with suspicion by the general public.

Many timber owners who now maintain their own private patrol frequently find their effort is fruitless on account of the carelessness of neighbors, who make no effort at protection and who are affronted by any suggestion designed to make him take greater precaution, because the State Fire Warden is in the employ of the timber owners.

The need of a more flexible fire law has been brought to our attention, and the suggestion has been made that Oregon should be divided into two zones, each covered by regulations in regard to fire permits which could be issued with much less hazard in the Willamette Valley than in the foothills; that by drawing a line north and south, passing through Coburg, Springfield, Oregon City, Silverton, and Lebanon, on the east, and a few miles from Roseburg, Forest Grove, and Corvallis, on the west, between which more latitude could be given as to permitting fires than in the foothill zones, where a close restricted season could be established with systematic patrol.

The question of insect depredation of our forests is a matter of great importance, which is being investigated by a committee of the Oregon Conservation Association in communication with Dr. A. D. Hopkins, of the Bureau of Entomology.

We bring to the attention of this Board the very complete report filed at the December meeting of the Conservation

Association, and suggest that the proceedings of this meeting, including the fire report and the report of the committee on depredations of insects be ordered printed by this Board for wide publicity, and we bring the assurance that the Oregon Conservation Association will undertake the distribution of such pamphlet if authorized.

We ask the members of this Board for their suggestions for our government during the coming close season, and thank each member for past co-operation, urging upon them the need for much personal effort in the very important work of this Board, which we have confidence can accomplish very much in arousing public sentiment, even though it labors under the disadvantage of such an inadequate appropriation. Of the appropriation $345 has been expended to date, leaving only $155 to cover the requirements of the current year.

To close this report and place before you many practical comments and suggestions which we fully endorse we quote in part as follows from a recent address on "The Future of the Forest," by E. T. Allen, former district forester, United States Forest Service, now forester, Oregon Forestry and Conservation Association:

"The future of the forest, generally and ultimately, is not particularly hard to foretell. It is not as dark as many think. The wide-spread destruction in China and other countries held up to us as awful warnings is not likely to be repeated in the United States, at least not to any such excessive extent. Our people are too intelligent. There has been, and will be, much bad forest use, but the general result may be fairly accurately prophesied. The pressure of growing realization of the situation by the public, together with voluntary adoption by timber owners of plans tending to improve and perpetuate their business, will see to it that land chiefly valuable for forest production is wisely put to that use. Some of it, probably less than at present, will be controlled by the Government. Much will be in state reserves, for the tendency is for states to go into this business as a means of better handling the lands they have and, once started, they are likely to acquire delinquent tax land and cut-over lands in too bad condition to warrant private reforestation.

"On the other hand, the increase of population and corresponding demand for agricultural products is certain to force a reduction of forest growing area.

"The rapidity and extent of the reduction of timber area in the United States can only be conjectured. Aside from soil considerations, it will be greatest in the most thickly settled portions of the country and where warmth and rainfall favor agriculture. It is certain that land now considered too remote, rough and poor will be utilized. Personally, we believe this change of standards and values will be greater and quicker than we like to admit, and that in calculating our future forest production, in order to assure us that the prediction of a timber shortage is a false alarm, many authorities reckon too large an area of perpetual forest land just as they fail to reckon a prodigiously increased consumption.

"At any rate, we premise a gradually reducing forest producing area, perhaps 25 per cent under state and federal control, and 75 per cent in private hands. We have said the latter, as well as the former,

will be under conservative forestry management. When it will all be so is merely a question of time. Economic laws leave no alternative.

"To follow the practice of every speaker on this subject, we must refer to Germany and France, where they spend $11,000,000 a year on forest management and get a net return of $30,000,000. The American is too good a business man to pass up a proposition of that kind. We have not reached German conditions yet, and probably will not while the subject interests you and me, but we do know that our consumption increases prodigiously every decade. We know that 50 years ago there was scarcely a lumber-user west of the Mississippi River, and we know something of the settlements, mines, railroads, and cities that have developed there since to use lumber. It is a poor westerner who doubts that the next 50 years will see a far greater development.

"Now let us consider what is most needed from the public. We think we will agree unanimously on better fire laws with State help in enforcing them, and in patrol, better tax laws, and better public sentiment without which laws are of small effect. These are the foundations on which everything must be built.

"The public and the lawmakers have got to be shown the importance of the lumber industry. Taking this region for an example, they must be shown that it brings nearly $100,000,000 a year into Oregon and Washington and that this immense sum is—cannot help being—shared by all persons and industries. It is circulated in every artery of their agricultural and commercial life. Forest resources are every bit as important to them as to the lumberman. In many ways more so, for if they are exhausted, he can move or change his business, while the dependent industries can't.

"They must be shown the effect of taxation. How as a great taxable resource timber helps support their state and county government. The cost of government is bound to increase as population grows, so they confront the problem of diminishing timber to tax and consequent heavier burden on other property. Show those in the timber counties that as they force cutting by taxes and burn the rest, they will have to pay all the taxes as well as pay more for their houses, fences, and fruit boxes. Show them where they lose by assessing cut-over lands so high you must abandon them to be reburned into a desert. Such lands pay little tax in the long run. The income of the county would be far greater if the burden was made so easy at first that you can afford to protect it and start a crop which some day they can tax. See that every citizen knows the effect of forests on irrigation, on floods, and on water powers. See that they realize that cut-over and burned areas are really as important to them as virgin timber, because they should be growing timber against that future time when the consumer's question may not be, "What must I pay for a board?" but, "Can I get a board?" Above all, talk to them about fire in a way they can understand. Don't threaten them with the law half as often as you tell them that timber makes pay checks and that, on every thousand feet burned, while the owner may lose $2 in stumpage, the community loses $10 in wages.

"Work for flexible laws, with non-political trained authorities that understand varying conditions to enforce them as conditions warrant. The narrow, inexpert, or prejudiced man, be he lumberman, conservation enthusiast, or politician, is the man you have to fear, and his name is legion. He is beginning to fool with a big problem and is not going to let go till something happens. I say again, don't ignore him. Study the problem yourself and beat him to it."

Upon motion the report as read was adopted and the Board proceeded to consider the suggestion of the secretary that

the deputy game wardens and deputy fish wardens be appointed fire wardens, if such duties would be consistent and agreeable to the chiefs of these departments, both of whom were present. Considerable discussion was held favoring the suggestion, and finally upon motion of H. C. McAllister it was ordered that deputy game wardens, deputy fish wardens, water bailiffs, and hatchery men, be appointed state fire wardens in line with the suggestion of the secretary, with the understanding that these men would be directed respectively by the State Game Warden, and State Fish Warden, who would direct them as to their duties in relation to forest protection. The motion was duly seconded and carried.

Upon motion it was determined that all of the timber owners of the State would be addressed by the secretary about May 1, 1910, asking them for the number of wardens whom they may desire to have appointed, with a list of names of such, detailing the territory which they will cover so as to avoid conflict of authority as much as possible within the same territory, and the secretary should thereafter send out regular appointments to such appointees, with a letter detailing their duties, etc.

Upon motion it was determined that the secretary should use discretion in the appointment of such road supervisors and sheriffs as may be reinstated in districts not covered by paid fire wardens, and that every effort should be made to have a fire warden available in each district to whom application could be made by homesteaders and others when they want to set a fire. In the discussion that followed it was stated that public sentiment is changing rapidly in regard to the improvement of forests and the need for public interest in protecting them from fire, and that residents are endeavoring to observe the law by applying for permits and should be accommodated wherever warranted, and proper explanation given when it would be hazardous to set a fire.

Upon motion of S. C. Bartrum, regular quarterly meetings were established for the State Board of Forestry to be held in the Governor's chambers at Salem at 11 A. M. on the second Monday of January, April, July, and October.

Upon motion of H. C. McAllister, the chairman of the Board was authorized to appoint a committee of three to be known as the legislative committee, who should take up with the next legislature and endeavor to obtain additional and remedial legislation in connection with the act creating the State Board of Forestry, to permit more effective work of this Board. Thereupon the chairman of the Board appointed as such committee A. B. Wastell, S. C. Bartrum, and L. S. Hill.

In the discussion following, there was an evident concensus of opinion that it was the Board's duty and privilege to conduct a vigorous educational campaign during this year for the purpose of enlisting the active co-operation of the citizens of the State in adopting every precaution against forest fires, and to this end a motion prevailed that in line with the recommendation of the secretary in his report that the proceedings of this meeting, including the secretary's report and as an addenda, include therein the report of the committee of the Oregon Conservation Association on insect depredation of the forest. This pamphlet to be printed by the State Printer on the requisition of this Board, with the understanding that such pamphlets will be distributed by the Oregon Conservation Association to the newspapers of Oregon, the members of the last legislature, the postmasters of Oregon, the notary publics of Oregon, and the county officials of Oregon, as well as to all conservation associations, timber owners, etc.

The secretary made a strong plea for earnest, consistent work by each member of the Board, to impress upon citizens and legislators that they should recognize the necessity for protecting our great forest resources from fire, and to this end provide sufficient appropriation to support a salaried State Fire Warden and proper organization, as is done in both Washington and California, as well as in many eastern states with far less forest resource.

No other business appearing, the meeting adjourned.

Respectfully submitted,

A. B. WASTELL,
Secretary.

ADDENDA

FIRST REPORT OF THE COMMITTEE APPOINTED BY THE OREGON CONSERVATION ASSOCIATION TO INVESTIGATE THE DEPREDATIONS OF INSECTS INJURIOUS TO FORESTS—THIRD QUARTERLY MEETING, DECEMBER 20, 1909.

By H. D. Langille.

The matter of insect depredations was brought to the attention of the Oregon Conservation Association at the September quarterly meeting, and a resolution was passed urging our representatives in congress to secure a larger appropriation for the Bureau of Entomology of the Department of Agriculture with which to carry on its investigations. A committee, consisting of J. C. Stevens, W. L. Finley, and H. D. Langille, was appointed to investigate the subject and report at the next quarterly meeting. Favorable responses as to willingness to cooperate have been received from our congressional delegation and from eastern timber owners, who in turn referred the matter to their respective delegations.

Your committee corresponded with the different state educational institutions of Oregon and Washington to ascertain what work, if any, had been done along the line of forest insect investigations. The replies received indicate that almost no attention has been given to the subject, although several expressed interest and willingness to assist so far as the limited resources of the institution would permit.

During some months past correspondence has been carried on with Dr. A. D. Hopkins, in charge of forest insect investigations of the Bureau of Entomology at Washington, and much valuable information has been received from this source. Mr. Langille's part of the report of the committee has special reference to the attitude of the Bureau of Entomology toward this association, the work it has done in determining the nature of the insect pests which destroy forest growth, and the measures recommended for protection against it; also some notes based upon his own observations. This report is as follows:

That the Bureau of Entomology may be relied upon to assist forest owners in any way practicable with the small appropriation available is evident from the letters I have received from Dr. Hopkins:

"In reply to your letter 57-X of the 15th inst., I beg to say that we have noted with much interest and gratification your kind interest in our work on forest insects, also your plans for taking the matter up with the timber owners of your region. * * * *

"Your reference to conditions in Clatsop County is of special interest, since I have visited that section, and we made quite extensive investigations at a station located at Hoquiam, Washington, for two seasons to find, if possible, the insect which was the cause of enormous destruction of timber in Clatsop and Tillamook counties in 1889-91, which, it is said, was caused by the defoliation of the hemlock and spruce 'by a measuring worm which transforms to a whitish moth.' This evidently resembled the pine butterfly. The trouble extended over parts of Clatsop and Tillamook counties, killing all of the hemlock and Sitka spruce in a belt between an elevation of 450 and 1,200 feet above tide. The Douglas spruce, pine, and cedar were not injured, thus indicating that it must have been a different insect from the pine butterfly. Apparently there has been no repetition of the work of this particular insect since 1891, or at least we have not been able to locate it. The old dead timber you saw in Clatsop County was evidently the remnant of timber killed at that time. The great amount of dead timber was the cause of very destructive forest fires which killed much of the remaining living timber.

"We shall be glad at any time to give you any additional information which will help you in your efforts to interest timber owners in the importance of the insect problem. It is especially gratifying to note that the Oregon Conservation Association will take the matter up.

"We were rather disappointed that the National Conservation Commission did not give more attention to the subject of forest insects.

"Our quite extensive investigations of the forest insects of Washington and Idaho indicate that the bark beetles known as the Douglas fir beetle, the western pine beetle, and the mountain pine beetle are by far the most important insect enemies of northwestern forests, and we are glad to note that as a result of your personal examination you realize the importance of the insect problem in its relation to the conservation of forest resources. It is only through such realization by timber owners that we can hope to interest them in the practical value of the results of our investigations or secure the proper and most economical application of the methods of control which we have found yield the best results.

"Your request for one of our experts to deliver a series of lectures upon the subject of depredations by insect enemies of forests and the opportunities it would offer us to get in direct touch with timber owners and others who are so intimately concerned in the prevention of avoidable losses of their timber, is fully appreciated, and it is a sincere disappointment to us that we cannot avail ourselves of this opportunity to render the desired service. The rapidly increasing demand for our attention to important forest insect problems in all sections of the country, together with our limited force of experts on the subject and the small amount of funds appropriated for expenses, require the most rigid economy and the concentration of our efforts to working up the results of investigations, for dissemination through publications and correspondence. It is hoped, however, that the increasing public interest in the subject and a realization of its real importance will soon lead to a sufficient increase in our appropriations to enable us to carry out our plans for enlarging the scope of the work and the location of field agents and experts in different sections of the country, where they will be immediately available for giving advice and instructions on the subject of insect control to the owners of timber. In the meantime, and under existing conditions, it is probable that you and other members of your association who are familiar with the more practical side of the subject, as regards the local conditions and the needs and opportunities of insect control can do far more than any 'scientist from Washington' towards interesting the average timber owner in the practical importance of the insect problem and the character and extent of losses through the death and decay of standing timber and reduced values and profits of logging and manufacturing operations.

"The facts brought out in our circulars, bulletins, year-book articles, etc., will give you the data for argument, and we shall be glad to furnish you with additional facts through correspondence as it may be required to clear up the obscure points until we can locate an expert in your section.

"I may say that it is the policy of this bureau to avoid sensational agitations relating to the depredations by forest insects, but through plain statements of the facts as determined by our investigations we are endeavoring to secure the best practical results from the dissemination and practical application of the knowledge thus acquired.

"We have your letter of the 1st inst., with enclosure of circular letter and clipping from the Oregon Journal relating to the action taken at the quarterly meeting of the Oregon Conservation Association in the matter of insect depredations in the forests of Oregon and adjoining states. It is needless to say that this action is most gratifying and encouraging to me, and that it is particularly appreciated by the chief of the bureau.

"The interest manifested by the members of your association in the subject of insect depredation opens up a field of splendid opportunities for us to render the required services in the formulation of a practical policy of insect control for the area in which the members are specially interested. Such a policy would not only be applicable to Oregon, but, with slight modifications to meet the requirements of different forest conditions, could be made to apply to the forest areas of the Pacific slope and western Rocky Mountain region from northern California and northern Nevada to British Columbia. Therefore, the efforts of the association to bring about some definite action along this line should be of special interest to the timber owners of the entire region.

"It should be made clear that the work of investigating the insects of that region has been done by the writer and his assistants during special exploration trips, and at special field stations at different times between the spring of 1899 and 1906. Therefore, we are quite familiar with the habits of the principal insect enemies of the standing timber and of the crude and finished products, and we have also determined practical methods of controlling some of the more destructive species.

"With this knowledge of the insects, it seems to me that the present need is not so much for further technical investigation, but for the dissemination of the acquired information, already available, and for its direct practical application by the owners of the timber. With these needs in mind, it appears that the most promising line of effort to meet the present requirements is

through your committee, especially in movements to interest the principal timber owners in the character and extent of damage and losses caused by insects which kill trees, and those which reduce the value of the product by boring into the wood of dying and dead trees, saw logs, etc.; also, to call attention to the practicability of preventing a large percentage of these losses by the proper adjustment of forest management and lumbering methods, which, with little or no additional cost, will contribute to the protection of the forest resources and to greatly increase the profits on investments and lumbering operations.

"When the timber owners or their managers have a clear understanding as to how insects contribute to the destruction or waste of forest resources; the extent of such losses as compared with losses caused by forest fires alone; some of the absolutely practical methods of controlling certain of the more important insect pests, and come to realize fully the necessity of expert advice in the consideration of the insects and the proper specific methods to adopt for each species, the conditions will be most favorable for the establishment of insect control policies on a sound and permanent basis.

"Without this essential educational work as a basis for practical results, our efforts to render assistance to the practical owner through our publications and correspondence will avail little. Therefore, if your committee will undertake to pave the way by getting in direct touch with the principal timber owners, and *do the part you can do best* in giving general information on how the insects cause losses, and how important it is as a strictly business proposition to give the matter special consideration and to ask for and apply the expert advice to be furnished by this bureau, we will gladly *do the part we can do best* in telling them what particular insect is responsible for a given injury and what can or cannot be done to prevent it. Then when a specially important case of depredation is reported and we have evidence that the local facilities and conditions are favorable for the successful prosecution of control work, we will make a special effort to put an 'expert on the job' to give advice and instructions relating to the more essential details with the object of making the case serve as a practical demonstration. In fact it is our policy (under the present requirements of economy of men and funds) *to concentrate our efforts where there seems to be the greatest need and where the best facilities and opportunities are offered for the successful prosecution of the work of technical investigation and practical demonstrations.*

"It seems quite important that there should be an outline or plan of procedure for the attainment of certain desired objects, both through the independent action of your committee and through its co-operation with this branch of the bureau, since it will be under such a plan that we can determine to what extent lantern slide specimens, special information, etc., are to be furnished to assist in your part of the work.

"As indicated in my letter of September 10, your committee can do more good towards disseminating the desired non-technical information relating to the general character of insect damage and the character and extent of the losses caused by them in an effort to arouse public interest than could be accomplished by the more technical man from this or other public institution. However, it is important that you should have a technical advisor and, if it is your desire to refer all technical matters, including specimens for identification, requests for specific advice on special insects and problems to this bureau, we will be very glad to co-operate with you and to meet you more than half way.

"We would be glad to have further suggestions from you as to what extent you will be able to carry on the educational features of the work, after which, if you so desire, we will suggest a plan of procedure so far as it relates to the attainment of the primary objects of our special work on forest insects.

"Again assuring you of our sincere appreciation of the action of the Oregon Conservation Association and our desire to help your committee in any way we can, very truly yours,

"A. D. HOPKINS,
"In Charge Forest Insect Investigations."

From these letters it is obvious that the things necessary for us to do are (1) to arouse timber owners to a realization of the fact that trees do not die without cause, and that in the majority of instances where single trees or groups of trees die the destruction is due to insects; (2) that an expert on the ground is not required in determining the cause; (3) that the habits of such insects as have caused the only notable loss throughout this region have been studied and plans formulated for their extermination; (4) that bulletins have been published which clearly illustrate these pests and their workings; (5) while we cannot hope to exterminate them from the forests which cover a wide and undeveloped region, it is possible to successfully combat them

to such a degree that wholesale destruction of timber upon large areas may be prevented.

So far as I am now informed there are only two genus of insects which have worked serious injury to our green western timber. The most formidable of these is the bark beetle, technically known as Dendroctonus. There are several species of this genus, but the most common in our State is the western pine bark beetle, D. brevicomia, which now appears to be in all our yellow or western pine forests. During the past season I have found this insect in each of the many sections of Idaho that I have visited; it is abundant in the pine belt of the Klickitat River; it is working on the upper White Salmon, and, I am told, has now appeared in the Des Chutes district, where a vast amount of western wealth is represented in the yellow pine belt of Eastern Oregon. Probably it is working elsewhere as well. In certain sections of one of the localities I have named, from 30 to 50 per cent of the forest has been destroyed, and it is possible that such a dire result may follow an infestation of this beetle in any district. The extent of the damage caused appears to be covered very largely by local conditions, such as weather, abundance of breeding places, and perhaps the presence of insect enemies. At least it is plain that with the ability of the insect to multiply its numbers, such quantities might be produced as would wipe out the pine on our hills and plains in a few years if no factors were contending against them.

While the species named is carrying on its destructive work in the yellow pine, it, or near relatives, is causing great loss of red fir, tamarack, and Lodgepole pine in the same localities.

Second in importance as an enemy to our forests is the pine butterfly, known as Neophasia Menapia, which appears at times in vast numbers in either the pine, fir or spruce belts. It is stated in one government report that at one time these insects were so numerous along the shores of Puget Sound that the surface of the water became "almost white with their floating bodies," and in Idaho "in 1898 dead butterflies occurred in such numbers as to dam the small streams." The damage done by this insect is thorough defoliation of the trees, either partial or complete. One of the worst features of their work is that they impair the vitality of the trees and so open the way for more serious damage by bark beetles.

Not only is the destruction done by these insects of serious moment, but in killing a large percentage of the trees in a forest a fire trap is laid which sooner or later is followed by a conflagration that completes the devastation. Such is said to be the history of the great burn which swept over parts of the coastal belt of Clatsop County a number of years ago. In that county there is evidence of this infestation still remaining, but although I saw many butterflies working in the timber near the Nehalem this year, I do not believe they were in numbers sufficient to cause serious damage.

The third menace to our timber is the borer which attacks fire-killed or wind-blown timber. It is a well known fact that our Douglas fir timber will remain sound and valuable for many years after it is killed, but these borers destroy its value for structural purposes very rapidly if they attack it. They breed and spread much as do the beetles, and the only method yet determined by which to exterminate them is putting the infested timber in water. By carefully watching their operations and logging the timber in which they appear, serious invasions may be averted.

This subject is so broad and has been so thoroughly treated in reports of government entomologists that it appears superfluous for me to rehearse the facts set down in the publications which are available to all. I would advise all timber owners to secure copies of these

reports and inform themselves regarding these insects. Don't shoot the woodpeckers or other birds in your timber. Though they may destroy insects that prey upon the larvæ of these injurious insects, it is believed by the government scientists that they are beneficial.

To my mind it seems advisable for us to endeavor to secure laws requiring timber owners to adopt means for destroying these pests when they appear in large numbers, just as we have laws requiring that orchards be protected against fruit pests, but I am not prepared to recommend this step at this time. I will correspond with the bureau officials upon the subject and report further. I would urge upon all timber owners operating in the pine districts the necessity for burning the slash in order to destroy the natural breeding places of the bark beetle.

In conclusion I would advise every timber owner to instruct his wardens and field men to watch for dying trees. If unable to determine the cause by referring to the published bulletins, a full report should be made to the department and advice asked. The destruction already caused by these insects is enormous in the aggregate. I am very sure that more timber in the pine belts of Oregon, Washington, and Idaho has been killed by insects than has been killed by fire. It is time to wake up to the necessity for prevention because these insidious attacks are going on all the time.

It has been estimated by Dr. Hopkins that the "Black Hills beetle killed approximately one billion feet of timber during the period of ten years, which at $2.50 per thousand would amount to an average of $250,000 annually"; and the same authority estimates that for a ten-year period the average amount of timber in the forests of the entire country killed and reduced in value by insects would represent an average loss of $62,500,000 annually.

NOTE: Subsequently through the efforts of Oregon's senators and congressmen, Mr. H. E. Burke, expert on insect pests of the Department of Agriculture, has been assigned to duty June 1, 1910, in the northwest to investigate and report on this very important subject.—*Secretary.*

Oregon's Forest Fire Problem

The Situation As It Exists
How Other Western States Are Meeting It
And What Oregon Must Do To
Be Equally Progressive

With A

Bill For Amending The Fire Laws

Prepared In Cooperation By The

OREGON STATE CONSERVATION COMMISSION
OREGON STATE BOARD OF FORESTRY
OREGON FOREST FIRE ASSOCIATION
OREGON CONSERVATION ASSOCIATION
WESTERN FORESTRY & CONSERVATION ASSOCIATION

and

Representing The Harmonized Joint Recommendations
of All Agencies, Officials, Public and Private
Interested In Forest Preservation
and
The Protection of Life and Property From Forest Fires

Why the Oregon Fire Laws Must Be Improved.

Although it has more at stake than any, Oregon is far behind most forest states in forest legislation. Excepting only land itself, the forests of the state are its most valuable natural resource, already distributing more wealth in the community annually than our apples, fish, wool and wheat combined, and capable of bringing in many billions of dollars. Their protection is of the highest importance to all classes of citizens alike, for no other resource contributes more to general development along all industrial and social lines. This applies not only to existing forests but also to growing forests and deforested land in which the lumberman has little present interest.

Injury to the Community.

Nevertheless, Oregon's lack of intelligent forest policy results in tremendous annual destruction, not only of the community's forest wealth and revenue, but often also of the lives and property of settlers. Besides merchantable timber, which, if saved for manufacture, would employ an army of laborers and bring in millions of dollars, a larger area of young growth which would make the forest of the future, is unnecessarily wasted each year. A taxable resource is destroyed, inevitably adding to the tax burden upon other property. The cost of forest products to our citizens is affected by every reduction of present and future supply.

What Other States Do.

Other forest states have seen these things and are constantly improving their forest laws. Pennsylvania spends $180,000 a year, New York $118,000, Maine $64,000. Washington, Idaho, California,—even New Jersey with $13,500,—are but a few of those that ealize their responsibility for the lives, property and welfare of heir citizens. No states, having begun the work, have abandoned :. Their people endorse further steps by almost every legislaıre. Yet in Oregon, where the peoples' interest is greater in xactly the measure that forests constitute a greater proportion f their resources, where the forests are so vast that we could not

if we would prevent their having a tremendous bearing on our whole economic system, practically no attempt has been made to develop a forest policy of any kind.

Past Legislation.

The legislature of 1907 recognized these facts to some extent and passed a law creating a Board of Forestry charged with investigating conditions and recommending further advisable legislation. It neglected, however, to provide funds for doing any real work, so the Board could only report to the next session that its facilities were insufficient to do much more than emphatically urge the creation of a state office to give the subject as much study and attention as are provided for the fisheries, dairying, agricultural and other resources of the state, and to take immediate steps to reduce the fire evil. The lack of facilities at its disposal prevented its adequately showing the need and method of remedy, and the legislature failed to act, although a bill containing some improvement passed the Senate and barely failed in the lower House. Probably the chief reason for its failure was the mere lack of marshaling its unquestionable popular support. As a result, Oregon encountered the bad fire season just passed with no preparation. The cost of fighting fire that might have been avoided had a better policy been in force, was far greater than the cost of such a policy, to say nothing of the irretrievable loss to the community of many millions of dollars and six human lives.

With this lesson still fresh, and with other states preparing for redoubled effort, we approach another legislative session. It is hardly conceivable that Oregon will continue to remain the only commonwealth indifferent to these attacks on its welfare, so it may be assumed that action of some kind will be taken. It is highly important that it be as well considered and as good as possible.

Proposed Action Widely Endorsed.

The last legislature, although believing itself without basis for establishing a definite forest policy, asked for further information on this and similar subjects by creating a State Conservation Commission charged with recommending legislation necessary to protect or promote the development of the natural resources of the state. This Commission, believing forest protection to be urgent, has devoted its effort to a study of this subject. It has consulted with every agency in Oregon possessing interest or in-

formation, whether state, federal or private, and has given exhaustive study to policies, methods and results in every state in the Union. It has also had a representative in attendance at the meetings of the Commission appointed by the Governor of Washington to revise the forest laws of that state. The recommendations for a forest code which it has decided to make are based upon practical tried systems, from which the points that have proved best are adapted and those which have proved weak are discarded. It is believed that their adoption will raise Oregon from the lowest to the highest rank in forest legislation.

Principles of Sound Forest Legislation.

It is believed that the best system for application in Oregon is one which:

1. Places a fair share of the financial burden on the timber owner.

2. Relieves the state by leaving the execution of actual fire work with the timber owner where his interest and practical competence tends to secure efficiency and economy.

3. Makes the state, on the other hand, also bear enough of the financial burden to discharge its obligation, secure public interest, encourage the maximum of private effort, and absolutely insure adequate protection of life and property in time of need.

4. Gives enough state supervision to insure execution for public advantage and enough state backing to enforce the fire laws against all offenders.

5. Provides facilities for collecting and using information necessary continually to develop and improve the state's forest policy, and for education of people and lumbermen alike in subjects of forest protection, management and replacement.

Summary of Amendments Necessary.

The provisions under which the revised law proposes to apply the above principles may be summarized as follows:

1. A trained, practical, and non-political State Forester, to develop and execute a consistent, rational, far-seeing state policy; and also, by publicity and education, to enlist the interest of public and land owners.

2. Sufficient assistance to the State Forester, when occasion requires, in apprehending violators of the fire laws and securing evidence for their prosecution.

3. A fund which will permit taking necessary steps to protect

life and property from fire when public safety so demands, especially in localities where settlers' interests are paramount and the interest of timber owners cannot be depended upon. The counties in which such service is actually performed by the state are to bear a fair share of the expense.

4. Encouragement of timber owners and counties in better organization for protective work.

5. General improvement of the fire laws.

6. Careful co-ordination of the above points in a way which will permit systematic cooperation of all agencies for fire prevention and not restrict any from constantly growing in effciency along such lines as the future shall prove best.

Since the existing law was intended as a framework, to be furnished by a following legislature with provisions for giving it life and efficiency after a year or two of operation and further study should enable doing that with confidence, it is necessary only to amend it here and there to add such provisions. In order, however, that the proposed amendments may be clearly understood, it is believed best to present the revised bill as a whole. It is as follows, the comment after each section explaining what is new and the object of the change.

Proposed Amendments in Detail.

Section 1. There shall be a State Board of Forestry, consisting of the Governor, the acting head of the forest school of the Oregon Agricultural College, and five electors of the State of Oregon, to be appointed by the Governor from and upon the authoritative recommendation of the Oregon State Grange, the Oregon Forest Fire Association, the Oregon Conservation Association, the Oregon and Washington Lumber Manufacturers' Association and the United States Forest Service, each to select and name one of such electors. In the absence of such recommndations the Governor shall nevertheless appoint said electors. Said Board of Forestry shall supervise all matters of forest policy and management under the jurisdiction of the state, and approve claims for expenses incurred under the provisions of this act. The members of said Board shall receive no compensation for their services thereon but shall be entitled to actual traveling expenses which may be incurred in attending Board meetings. Said Board shall meet at any convenient place in the state upon the call of the Governor or its secretary. A majority of said Board shall constitute a quorum.

(This section amends the first section of the old law by substituting a member of the State Grange and a member of the Oregon Forest Fire Association for the Secretary of State and Fish and Game Warden. The most modern and successful method of determining the character of forestry boards, which necessarily handle many semi-technical matters, is to eliminate political positions as far as possible and select the membership with a single view of securing the most competent expert judgment on the subjects with whch it deals. This was the basis of the original section, and the amendment is merely to give it more logical perfection. There is no other material change.)

Section 2. The State Board of Forestry shall appoint a State Forester, who shall be a technically trained forester familiar with Western conditions and experienced in organization for the prevention of forest fires. He shall hold office at the pleasure of said Board, which shall also have power to fix his compensation at not to exceed four thousand ($4,000) dollars per annum. He shall be authorized and empowered to appoint a deputy whose salary shall be fixed by the State Board of Forestry at not to exceed two thousand ($2,000) dollars per annum. He shall be allowed necessary office and contingent expenses, including clerical help, and he and his deputy shall be paid actual traveling and field expenses which may be incurred in the performance of their official duties. He shall, under the supervision of the State Board of Forestry, execute all matters pertaining to forestry within the jurisdiction of the state; appoint and instruct fire wardens as provided for in this act; direct the improvement and protection of state forest lands; collect data relative to forest conditions; take such action as is authorized by law to prevent and extinguish forest, brush, and grass fires; enforce all laws pertaining to forest and brush-covered land and prosecute for any violation of said laws; cooperate with land owners, counties or others in forest protection; advise and encourage reforestation; and publish such information on forestry as he may deem wise. He shall act as secretary of the State Board of Forestry and prepare annually a report to the Governor on the progress and condition of state forest work, containing recommendations for improving methods of forest protection, management and reproduction within the State of Oregon. During the State Forester's absence or disability, all his authority shall be exercised by his deputy.

(This section does not change the duties or functions of the Board except in empowering it to employ a State Forester to execute its policy and to furnish him necessary facilities. Every safeguard is employed to remove this position from political pressure or embarrassment. The qualifications are such as to admit only a competent practical man, and as there is little possibility that a board so composed will fail to exercise good judgment, the terms of compensation are left to it in order to insure

getting the best man for the least money. This section is probably the most important in the proposed bill, for practically nothing can be accomplished without a good man to execute the forest laws and develop a systematic policy. It is absurd to suppose that in this, any more than in any other line of State effort, the work will proceed of itself Elsewhere a State Forester is the first thing provided, even if he is left for some time to organize a system with which to work, and Oregon's experiment of providing a system without a head has been amply proved a failure. And it is most essential to get a good man, not a cheap one, for upon him depends the effective use of the entire appropriation.)

Section 3. Under such general policy as to qualifications, numbers and localities as the State Forester shall deem wise, he shall appoint suitable and proper citizens fire wardens who shall have all the powers given to fire wardens under this act, but shall serve voluntarily or under compensation by property owners or counties. State and county officials whose duties make their ex officio services as fire wardens especially desirable as a convenience to the public, shall accept appointments as such when formally requested by the State Board of Forestry. Upon the recommendation of federal forest supervisors, the State Forester shall appoint resident officers of the national forests ex officio fire wardens. In times or localities of particular fire danger, or to enforce the fire laws or apprehend and prosecute violators thereof, the State Forester shall have power to appoint and employ, either independently or jointly with other agencies, such additional fire wardens, and to furnish these such assistance and facilities for protecting life or property from fire, as he shall deem public safety demands, and unless contributed by other sources, the cost thereof shall be paid from the funds appropriated by this act, but each county in which such service is given shall be responsible for one-third the expense thus actually incurred and paid by the state for services within said county and upon demand by the state treasurer shall pay the amount thus due into the state treasury, to be credited to the fund appropriated by this act.

(Section 3 contains the provisions of the original section except that the State Forester, instead of the Board, has authority to appoint voluntary fire wardens, and is further empowered to employ men at State expense on certain occasions, within the limits of his funds. One of the weakest points in the present system is that the fire laws are practically a dead letter because not enforced. They are regarded with indifference or contempt not accorded to any other laws for the protection of life or property, although in no way less entitled to respect. To enforce them is a police function and only the State can exercise it effectually. The warden employed by private owners can patrol or fight fire, but cannot successfully exert police power or prosecute, and this fact is well known by offenders. One of the first essentials of fire prevention is ability to apprehend and prosecute when violations occur. No great expense need be incurred, for the knowledge that action can and will be taken will

make violation the exception, as in the case of other laws, instead of the rule. But there must be a remedy for the present situation in which, as has actually occurred several times this year, miscreants deliberately set fires, destroying property, and the sufferers do not dare swear complaint for fear of retaliation. Moreover, the safety of life and property cannot be ignored in regions where no private effort exists. The past season has proved the necessity of means for protecting settlers and villages in times of stress. This section provides for rendering such aid promptly and efficiently, the county to which such service is given bearing a fair share of the expense. It is adopted from the Washington law, where it has been on trial many years and is endorsed by all concerned.)

Section 4. The State Forester shall, with the advice of property owners or agents or counties desiring to cooperate in forest protection, designate suitable areas to be official fire districts. He may appoint for each district one or more district fire wardens to be paid as other fire wardens under this act and to serve until their appointments are revoked by their employers' request or by the State Forester for good cause shown. Upon written notice to the State Forester by the person or authority upon whose recommendation any other fire warden is appointed, said fire warden shall be subject to the direction of the proper district fire warden.

(This is a new section based on usage in other states and notably successful in Idaho. Conditions of topography, forest cover, ownership and fire hazard usually suggest several areas in which systems of fire prevention should differ in method, expense and control. Even if the only preventive work in these is by private owners, there may be a distinct advantage in having defined districts in which uniformity can be sought without confusion with differing conditions elsewhere, and not only in such work as patrol but also in details like the issuing or refusing of burning permits. This section facilitates co-operation along these lines between private or county wardens or with the State, through having a local central authority, but does not compel it where no advantage will result.)

Section 5. Any and all inadequately protected forest or cut-over land adjoining, lying near, or intermingled with other forest land and covered wholly or in part by inflammable debris or otherwise likely to further the spread of fire, which by reason of such location or condition or lack of protection endangers life or property, is hereby declared to be a public nuisance and whenever the State Forester shall learn thereof he shall notify the owners or persons in control or possession of said land, requesting them to take proper steps for its protection and advising them of means and methods to that end.

(This is a new section which will have the effect of collecting information concerning fire hazard in the State and in having the persons responsible therefor notified of the laws and of any co-operative or other

systems of which they may avail themselves. To a large extent, failures to protect is due to thoughtlessness and lack of information. It gives the State Forester no dangerous arbitrary power, but enables him to give warning in a way which tends to fix responsibility.)

Section 6. All fire wardens appointed under this act shall, under instructions from the State Forester as to their exercise of state authority, take proper steps for the prevention and extinguishment of fires within the localities in which they exercise their functions, assist in apprehending and convicting offenders against the fire laws, control the use of fire for clearing land in the closed season as provided by Section 8 of this act, and make such reports of their work and conditions within their localities as may be requested by the State Forester. They shall have the power of peace officers to make arrests for violations of forest laws. They shall have power to enter upon the lands of any person or owner in the discharge of their duties; provided, that in so entering they shall exercise due care to avoid doing damage. Any fire warden who has information which would show, with reasonable certainty, that any person has violated any provision of the forest laws, shall immediately take action against the offender, either by using his own power as a peace officer or by making complaint before the proper magistrate, or by the filing of information with the district attorney, and shall obtain all possible evidence. Failure on the part of any fire warden receiving compensation to comply with the duties prescribed by this act shall be a misdemeanor and punishable by a fine of not less than twenty ($20.00) dollars, nor more than two hundred and fifty ($250.00) dollars, or by imprisonment in the county jail for not less than ten (10) days nor more than three (3) months, or both such fine and imprisonment.

(This is Section 4 of the old law, moved forward to sixth place. The only change is to have wardens make reports to the State Forester instead of the Board, and to refer to Section 8 correctly, since it also has a new number.)

Section 7. All fire wardens shall have authority to call upon able-bodied citizens between the ages of sixteen and fifty years for assistance in stopping conflagrations; and any such person who refuses to obey such summons, if assured compensation at a rate equalling or exceeding that for road labor in the surrounding road district, unless it is found on the trial for such offence that such obedience to such summons would have worked an unreason-

able hardship upon such person or some member of his household, is guilty of a misdemeanor, and shall be punished by a fine not less than fifteen ($15.00) dollars, nor more than fifty ($50.00) dollars, or by imprisonment in the county jail of the county in which conviction shall be had, not less than ten (10) days, nor more than thirty (30) days, or by both such fine and imprisonment; **provided,** that no citizen shall be obliged under this section to fight fires a total of more than five days in any one (1) year.

(This puts into the Oregon law a provision contained in the laws of California, Washington, Idaho and other states, which is exceedingly desirable, although very seldom actually used. Persons are far more likely to handle fire with precaution when they know that carelessness may result in their being made to work in consequence.)

Section 8. During the period between June 1st and October 1st, which is hereby designated the closed season, it shall be unlawful for any person or persons to set on fire, or cause to be set on fire, any slashing, chopping, woodland or brush land, either his or their own or the property of another, without written or printed permission from a fire warden and compliance with the terms thereof which shall prescribe the conditions upon which the permit is given and which are necessary to be observed in setting such fire and to prevent it from spreading so that life or property of another may be endangered thereby. This restriction shall not apply to the burning of log piles, stumps or brush heaps, in small quantities, not nearer than one-fourth (¼) of a mile from other inflammable material and under adequate precautions and personal control, and in accordance with any regulations which may be adopted by the State Board of Forestry for the purpose of insuring public safety; but if any such burning without permission shall result in the escape of fire and injury to the property of another, this shall be held **prima facie** evidence that such burning was not safe and was a violation of this section. Violation of these provisions shall be punished by a fine of not less than twenty-five ($25.00) dollars, nor more than five hundred ($500.00) dollars, or by imprisonment of not less than ten (10) days nor more than three (3) months. Permits to burn, as provided by this section, may be issued by any fire warden, and shall contain such safeguarding restrictions as to time of burning and precaution to be taken as may be fixed by the State Forester or left by him to the discretion of fire wardens. Any fire warden shall have the right to refuse, revoke or postpone permits when necessary to prevent danger to the life or property of another.

Any permit obtained through wilful misrepresentation shall be invalid and give no exemption from liability of any kind. In times and localities of unusual fire danger, the Governor, with the advice of the State Forester, may suspend any or all permits or privileges authorized by this section and prohibit absolutely the use of fire hereinmentioned. Whenever, or wherever, during an open season for the hunting of any kind of game in this state, it shall appear to the Governor upon the showing of the State Forester that by reason of extreme drought the use of fire arms or fire by hunters is liable to cause forest fires, he may, by proclamation, suspend the open season and make it a closed season for the shooting of wild birds and animals of any kind for such time as he may designate, and during the time so designated all provisions of law relating to closed seasons for game shall be in force.

(This section amends Section 5 of the old law by specifying a safe distance from inflammable material at which burning may be done during the closed season without permit. As it was, fire was frequently set under semblance of detachment but with practical certainty of becoming exactly such a fire as was prohibited. There is also added to the section a provision adopted from other states to authorize the Governor, in extreme emergencies, to suspend temporarily the use of fire for certain non-essential and dangerous purposes. He would seldom use this power, but authority should be provided as it is for other extraordinary situations which may threaten life and property.

Section 9. Any person who sets on fire, or causes to be set on fire, any woods, brush, grass, grain, stubble, or other material being or growing on any lands not his own, without permission from the owner, or who wilfully or negligently allows fire to escape from his own land, or any one who accidentally sets any fire on his own land or another's and allows it to escape from his control without extinguishing it, or using every effort to do so, shall be punished by a fine of not less than fifty ($50.00) dollars, nor more than one thousand ($1,000.00) dollars, or imprisonment for not less than one (1) month nor more than one (1) year; **provided**, that it shall be lawful to build, in a careful manner, camp fires on any uninclosed lands, the owner of which has not forbidden such building of camp fires thereon by personal notice or by posting such prohibition in conspicuous places or otherwise, if, before departing from the place which such camp fire has been built, the builder of such fire totally extinguishes the same; and, **provided, further**, that nothing in this section shall apply to the setting of a back fire, in good faith, to prevent the progress of a fire then burning.

(Mere renumbering of the old Section 6, without a word changed.)

Section 10. Any person who builds a camp fire upon lands within this state, not his own, without clearing the ground immediately around it, free from material which will carry fire, or who leaves thereon a camp fire burning and unattended, or who permits a camp fire to spread thereon, or who uses in any firearms discharged thereon other than incombustible gun-wadding, shall be punished by a fine of not less than twenty-five ($25.00) dollars, nor more than five hundred ($500.00) dollars, and upon refusal or neglect to pay the fine and costs imposed shall be imprisoned for a period not to exceed one day for every two ($2.00) dollars thereof, or may be subject to both such fine and imprisonment at the discretion of the court.

(Section 7 renumbered.)

Section 11. From June 1st to October 1st of each year it shall be unlawful for any person, firm or corporation, or employee thereof, to use or operate any locomotive, logging engine, portable engine, traction engine or stationary engine using fuel other than oil, in or near forest or brush land, which is not provided with an adequate spark arrester kept in constant use and repair. Any person, firm or corporation who shall wilfully fail to comply with the foregoing provisions of this section, shall be guilty of a misdemeanor, and upon conviction thereof shall pay a fine for each engine or locomotive without such spark arrester of not less than twenty-five ($25.00) dollars, nor more than one hundred ($100.00) dollars, and shall be enjoined from further use of such engine or locomotive until such spark arrester is provided. Escape of fire from any engine shall be **prima facie** evidence that such appliance has not been adequately maintained in compliance with this section. Upon proof that any prosecution has been instituted under this section by any fire warden, any court of competent jurisdiction shall enjoin the further use of the engine involved, unless equipped and maintained in compliance with this section to the satisfaction of said fire warden, until the defendant has been acquitted of the charge preferred.

(Section 8 renumbered, with some addition to permit enforcing compliance with the spirit of this section. There is frequent complaint that merely nominal devices are employed.)

Section 12. All persons, firms or corporations engaged in logging, or permitting logging upon their lands, in this state, shall each year burn their annual slashing, by which is meant the tops

and inflammable refuse left after lumbering, that may carry fire or cause it to spread, at such time and in such manner and with such provision of help as will confine the fire to their own lands, and if such burning is done between June 1 and October 1 shall first cut down all dead trees or snags over twenty-five (25) feet high. Builders of trails, roads or railroads in this state shall immediately destroy or remove all inflammable material resulting from constructing or clearing for such improvements unless prevented under the provisions of Section 8 of this act. Any person, firm or corporation operating a railroad in this state with coal or wood fuel shall annually, or when so directed by the State Board of Forestry, and in a manner and to an extent directed by said board, destroy or remove all inflammable material from the right of way of said railroad. All burning under the provision of this section shall be in accordance with the provisions of Section 8 of this act. Refusal or neglect to comply with the provisions of this section shall be punished by a fine of not less than one hundred ($100.00) dollars, nor more than one thousand ($1,000.00) dollars for each offense; **provided,** that the State Forester, with the consent of the Board of Forestry, may suspend the restrictions of this section when and where he deems public safety so permits or requires. **It is further provided,** that in the absence of such suspension, and in case of refusal or neglect by any person or persons at fault, after proper notice, to take the precautions against fire required by this section, the State Forester, or a district fire warden acting with his consent, may have the work done to the extent he deems requisite to public safety, and the cost thereof and the expense of any fire patrol rendered necessary by the delay shall be recoverable from the offender by action for debt.

(An incorporation of the old Sections 9 and 10, with the following added provisions:

Loggers must cut dead snags before burning slashings in spring or summer, in order to prevent smouldering fire from being scattered from them later during dry windy weather. This precaution is generally urged by progressive lumbermen themselves.

Debris from road and railroad building, which is peculiarly likely to be ignited, must not be allowed to accumulate.

When competent authorities believe the restrictions of this section are unnecessary or impracticable, they may be suspended for any advisable time or locality.

When compliance with the section is necessary to public safety it may be actually enforced, which is a different thing from merely punishing failure to comply. Fines, aside from difficulty or delay in collecting them, do not retrieve actual losses caused.

Section 13. Any person who shall unlawfully or maliciously set fire to any woods, forest, timber, brush or any vegetable matter whatever with intent that the property of another shall be injured thereby, shall be guilty of a felony, and upon conviction thereeof shall be punished by imprisonment in the State Penitentiary for not less than one (1) nor more than ten (10) years.

(Old Section 11 renumbered.)

Section 14. In addition to the penalties provided in this act, the United States, state, county, or private owners, whose property is injured or destroyed by fires in violation of this act, may recover in a civil action double the amount of damages suffered if the fires occurred through wilfulness, malice or negligence; but if such fires were caused or escaped accidentally or unavoidably, civil action shall lie only for the actual damage sustained as determined by the value of the property injured or destroyed, and the detriment to the land and vegetation thereof. Persons or corporations causing fires by violations of this act shall be liable in action for debt to the full amount of all expenses incurred in fighting such fires.

(An amendment of old Section 12. Is taken from the California law and is about as usual in state forest codes. The old Section merely said actual damages could be recovered.)

Section 15. Any person not employed and compensated as a fire warden who shall detect any one violating any of the provisions of this act, and shall furnish information leading to the arrest and conviction of such person, shall, upon his conviction, receive one-half of the fine paid by such person so convicted, otherwise all fines imposed under this act, less the cost of collection, shall go into the general fund of the county in which conviction is had.

(Is Section 13 renumbered, with the words "less cost of collection" inserted.)

Section 16. Whenever an arrest shall have been made for violation of any provision of this act, or whenever any evidence which shows with reasonable certainty any such violation shall have been lodged with him, the District Attorney for the county in which the criminal act was committed must prosecute the offenders with all diligence and energy. If any District Attorney shall fail to comply with the provisions of this section he shall be guilty of a misdemeanor, and upon conviction shall be fined not less than one hundred ($100.00) dollars, nor more than one thous-

and ($1,000.00) dollars, in the discretion of the court. Prosecution against the District Attorney shall be conducted by the Attorney-General. The penalties of this section shall apply to any Justice of the Peace, with proper authority, who refuses or neglects to issue a warrant for the arrest of any person or persons when complaint, under oath, of violation of any terms of this act has been lodged with him.

(A new section taken from the California law and in some similar language very generally in use elsewhere.)

Section 17. The Secretary of State shall, upon request of the State Forester, furnish such printed circulars and cloth notices and such forms and blanks as shall be necessary to carry out and give publicity to the provisions of this act, the cost of providing such circulars, cloth notices, forms and blanks to be paid from the appropriation for defraying the expenses of the public printing, binding, etc., provided for the various state departments, boards, commissions, etc. Any person who shall wilfully destroy or injure any notice posted in compliance herewith shall be punished by a fine of not less than ten ($10.00) dollars, nor more than fifty ($50.00) dollars, or by imprisonment for one (1) day for each two ($2.00) dollars of such fine imposed in case of his neglect or refusal to pay such fine.

(Old Section 14, with "Forester" substituted for "Board of Forestry.")

Section 18. County Boards of Commissioners may appropriate money for forest protection under the provisions of this act and expenses incurred by any County Board of Commissioners in accordance therewith shall be a proper county charge.

Section 19. For the purpose of carrying out the provisions of this act, including the payment of the salaries and expenses of the officers and employees for which the state is liable under this act, there is hereby appropriated out of any funds in the treasury not otherwise appropriated the sum of one hundred thousand ($100,000.00) dollars, or so much thereof as may be necessary. The Secretary of State is hereby authorized and directed to audit all duly approved claims which have been incurred in pursuance of this act and the foregoing appropriation and to draw his warrant on the State Treasurer in the payment thereof out of the appropriation made by this act or other appropriation from which the same may be determined to be payable.

Section 20. If any section, subdivision, sentence or clause of this act is for any reason held to be unconstitutional, such decision shall not affect the validity of the remaining portions of the act.

Section 21. It is hereby adjudged and declared that precautionary measures provided by this act must be taken immediately and before the actual fire season, and that since existing conditions are such that this act is necessary for the immediate preservation of the public health and safety, an emergency is hereby declared to exist and this act shall take effect and be in full force and effect from and after its approval by the Governor.

Section 22. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

The Appropriation Question.

It is proposed to use the above-requested appropriation of $50,000 a year as follows:

For giving the state forest office necessary facilities for full efficiency, including salaries; clerical, traveling and similar expenses; equipment, supplies and postage; educational work; travel expenses of board members, etc. (This item is fundamentally essential and will be permanent.) Approximately $10,000

For apprehending violators, securing evidence, and otherwise enforcing the fire laws against careless railroad companies, loggers, campers and others. (This item is particularly important in the beginning of the state's work, but will probably grow less so after two or three years have brought more respect for the laws and better sentiment generally.) Approximately 5,000

For fire patrol and fighting demanded by public safety, particularly where only state action can be relied on to protect settlers and villages. (If not needed, this will not be spent. If it is needed no one should grudge it. The counties rendered such service will bear a third of the expense.) Approximately 35,000

Total $50,000

This fifty thousand dollars to preserve life, property and forest resources in Oregon amounts to about a sixth of a cent an acre for the area of the state subject to fire. It represents an insurance costing less than a tenth of one per cent on the **community interests threatened by fire, absolutely excluding stumpage value of timber to its owners.** The average annual losses to the community from fire in the past have been six or seven million dollars; in other words, our present loss in **one year** would pay for this proposed protection for over 100 years. The billion and three-quarters feet of timber burned in Oregon this year, if saved for manu-

facture, would have brought about $23,000,000 into the state, of which fully 80 per cent would have gone to the general public for labor and supplies, exclusive of lumbermen's or timber owners' profits. The **interest alone** on this community loss, at only three per cent, would more than equal the sum asked for to prevent such losses.

We must spend this money in some form. If not in prevention, the cost will be in increased taxes, decreased markets, lessened investment values, unemployed labor, destroyed property, human distress, and **fighting preventable fires.** These costs will be far greater to the taxpayer than the imperceptible burden this bill entails. And, if any citizen remains unconvinced of his financial interest, let him read the following actual extract from the report of a volunteer fire warden this year and **ask himself if he wants the moral responsibility for repeating scenes like these in Oregon.** This occurred in Clackamas County, not 30 miles from Portland.

"On August 25th, when working our way across an 'old burn,' which had been swept by fire the evening before, and was still difficult to cross on account of the thousands of dead trees and logs which were yet burning, and the dense smoke, which at times, was almost blinding, we came upon one of the most pitiable sights I have ever witnessed. In a small clearing, barely larger than a garden patch, stood a man and his wife, both past the prime of life, munching a few crusts of bread which appeared to be all they had saved. Where they stood was their door yard, or had been the day before. Near by was the smouldering ruins of their home. Their house, barn, fencing, wagon and implements were all destroyed. Not even the few stands of bees, which had been their main source of income, were left.

"In the center of the garden patch were two small mounds of earth which had more the appearance of newly-made graves than anything else, but which the man explained, in broken English, was where he and his wife covered themselves with earth to keep from burning to death by the flames which had surrounded them. They had barely enough clothing to cover their bodies and the woman said, as the tears came to her eyes, 'This is all we have left.'

"These people, though poor, are of the sturdy type who pioneer the settlement of our forests, foothills and burned-over lands, which later become our best fruit and agricultural lands. They had spent five years of hard toil and labor to make for themselves a comfortable home in old age, but now must begin all over again. This is only one instance of many that might be mentioned."

Our neighboring Pacific Coast States already stand creditably before the Nation with their forest protective systems, showing that they believe in states' responsibilities as well as states' rights. It will be bad advertising as well as false economy if Oregon, with greater resources to protect and develop, and at a time when the fires of 1910 and the talk of conservation are focussing attention upon the West, remains the only one unwilling to protect the lives and property of its settlers and the permanence of its business prosperity.

OREGON STATE BOARD OF FORESTRY

Bulletin No. 1

F. A. ELLIOTT, - - State Forester

In co-operation with the

OREGON AGRICULTURAL COLLEGE

THE FORESTS OF OREGON

Their Importance to the State

By

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Oregon Agricultural College

MAY, 1911

SALEM, OREGON

WILLIS S. DUNIWAY, STATE PRINTER

1911

Second growth Douglas Fir. Our future timber supply.

The Forests of Oregon

Their Economic Importance

INTRODUCTION.

The process of developing a forestry policy in the United States has been slow and, at times, discouraging. Slow, in the minds of those who have studied the entire problem of forestry in relation to the welfare of the people as a whole, for they know the tremendous expenditures of money which must be made to repair the damage done to the National forest crop, to provide an adequate timber supply for the future. Discouraging, because, even when majorities have favored meritorious legislative measures, selfish influences have thwarted their enactment.

Taking the whole matter into consideration, however, great progress has been made. The National forests now contain nearly 200,000,000 acres, dedicated to the production of timber for the benefit of all the people. A number of the States have made a beginning in the acquisition of state forests while some of the larger owners of timbered lands are taking preliminary steps, looking to the application of forestry methods to their holdings.

It may be taken for granted that forestry has come to stay. It will remain a policy, a business and a profession, because a majority of the people are convinced that the forests are essential to the public welfare. Not only will forests be maintained in this country, but existing forests will be greatly improved as the people become more thoroughly convinced of the advisability of making larger expenditures for that purpose. Whether the work shall be done by the Federal

government, by the State government or by private effort or by a combination of these agencies, is a matter which will be worked out in the right way when the good sense of all the people is brought to bear on the subject.

Since the real merits of the forestry problem have been frequently lost sight of in controversy concerning the methods to be employed in accomplishing the desired end, it is thought fitting that this little booklet be issued as a means of assisting the people of this State to a better understanding of the great economic importance of their woodlands to the commonwealth.

The illustrations in this bulletin are from photographs supplied by the Forest Service.

FORESTRY: WHAT IT IS.

Fundamentally, forestry means no more than the planting, tending and harvesting of wood crops. It may be compared with agriculture, with the difference that the planter must wait from ten to one hundred years to harvest his crop, depending on the kind of material he wishes to produce. In Europe this peculiar phase of agriculture has been practiced for more than 500 years. The beginnings, of course, were crude, but the present methods are decidedly exact and intensive. To such a scientific nicety has the business of raising timber been reduced that the German forester can tell almost to a cubic foot the amount of material a given tract of land will produce. Consequently he can ascertain very closely the per cent which an investment in forest property will yield. In fact, forestry in European countries has been brought to such a state of accuracy and stability that forest properties rank close to government bonds in security.

It goes without saying that intensive European methods are not at present applicable to American conditions. It is equally certain, however, that some system of timber culture and management must be practiced in this country if succeeding generations are to enjoy the luxury of a liberal, or even meager, supply of timber. Stated another way, forestry must be practiced in some form if future generations are to have timber at all.

THE GOVERNMENT LAND POLICY.

Early in the history of our country the government came into possession of vast areas of land. This land was acquired by treaty, conquest and purchase. The individual additions to the public domain are a part of the history of the United States, so familiar even to the school children as to need no enumeration here. So great was the area of public land that the disposition of it presented a formidable problem to the early lawmakers of our country. Uncle Sam was "land poor." In fact, at the middle of the century just closed, he could have supplied every citizen with a fertile farm.

The first land laws provided for direct sale, since the government was in debt, and the public lands were regarded as an asset which might properly be disposed of to increase the revenue of the young republic. Under various forms of sale, more than 182 million acres of government land have passed to private ownership. The "homestead act" passed in 1862, resulted in locating many actual settlers on the public land, and hence it may be regarded as the most important of all the public land laws. Under it more than 115 million acres of land have been disposed of. However, since it contained a "commutation clause" under which the locator might secure patent after six months actual residence on the land, this act, together with those providing for the direct sale of public land, was fraudulently used by land speculators for the acquisition of vast holdings. So called "dummy entrymen" were located on the land, with the understanding that title should pass to their employers as soon as a patent had been obtained from the government. This evasion of the law explains the existence of many large estates in this and other parts of the country, in which an immense amount of timber wealth is securely "bottled up." On the other hand, it need hardly be said, many large holdings were honestly and legally acquired.

Mr. H. H. Schwartz, special agent of the Federal Land Office says: "Actual inspection of hundreds of commuted homesteads shows that not one in a hundred is ever occupied

A familiar Oregon scene. The source of our streams.

as a home after commutation. They become a part of some large timber holding or parcel of a cattle or sheep ranch."*

Considered in connection with the immense grants made to railroads and other corporations, ostensibly as aids in construction, these facts are essential to an understanding of the ownership of forested and other areas in this State.

THE INCREASING VALUE OF TIMBER.

It is a matter of familiar history that the forest in the development of any new timbered country is a hindrance to man. The pioneer must clear the land to provide space for his crops and pasture for his flocks and herds. From the time of the early settlements on the shores of the Atlantic, to the present, the axe and fire have moved in the vanguard of settlement. The old settlers of the middle west tell of the neighborhood "log rollings" of their younger days, where virgin oak, walnut and other hardwoods were piled and burned, material which, if standing today, would have a value far beyond that of the cultivated land.

In this State, in common with other western states, the story has been repeated, with the exception, however, that the area of tillable land, by comparison with the non-agricultural land, is small and consequently the actual destruction of timber by clearing for the purpose of cultivation has been less than in the older states of the east. At the same time much valuable material has been consigned to the log heap because the owner regarded the space it occupied as of more value in satisfying his present needs than any future price which he might hope to receive for his stumpage.

Lumber, like any other commodity, has a present value, fixed by the economic law of supply and demand. If there is an active demand for the various forms of timber products, prices will advance, providing the supply is not increased in proportion to the demand for the material. On the other hand if the supply of material is increased more rapidly than the stuff is used the value is bound by the same law of supply and demand to decrease.

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*For further discussion of this matter see "The Timber and Stone Act and the Commutation Clause of the Homestead Act," by H. H. Schwartz, Report of National Conservation Commission, Vol. III, pp. 390-392.

Within a National forest. Land logged with care, brush piled for burning.

Unlike other products of the soil, timber cannot be quickly produced to satisfy the increased demands made for it. Satisfactory saw timber of any suitable grade, cannot be produced in this country short of 75 or 100 years. Here, in this simple statement lies the basis of the whole argument concerning a rapid increase in timber values in the near future as well as that for a prospective timber shortage due to the exhaustion of the available supply.

History does not show another nation which has made the rapid strides in wealth and population as has the United States. Nor does it show another nation which has wasted its natural resources with equal prodigality. The forests have been ruthlessly slaughtered until today a timber famine menaces the nation. Minerals have been recklessly exploited until the end of the most valuable, coal and iron, is in sight. Finally, and most serious of all, millions of acres of soil have been robbed of their primal fertility by crude methods of tillage and the headwaters of streams have been stripped of the protective forest cover, so that flood waters have been hurled upon the cultivated valleys, with the result that millions of cubic yards of the richest soil are annually carried into the rivers and oceans, lost to man's use forever.

As a nation, then, we have been heedless of the right of future generations. We have made no effort to preserve the fertility of our soils. We have not tried to check the destructive action of flood waters. Until within a few years we have made no effort to provide for a future supply of timber.

It is estimated that the original forests of the United States contained not less than 4,800 billion feet, board measure of saw timber. Of this colossal amount, only 2,800 billion feet remains and much of that is of an inferior quality due to the culling methods of the lumberman, in taking out the better grades of material.

The annual drain upon our forests, not counting the losses due to fire, storms and insects, is 20 billion cubic feet. The annual addition to the standing timber, due to growth, is less than seven billion cubic feet. It follows that we are cutting our timber three times as fast as nature is reproducing it, while

Yellow pine. In one of Oregon's east side forests.

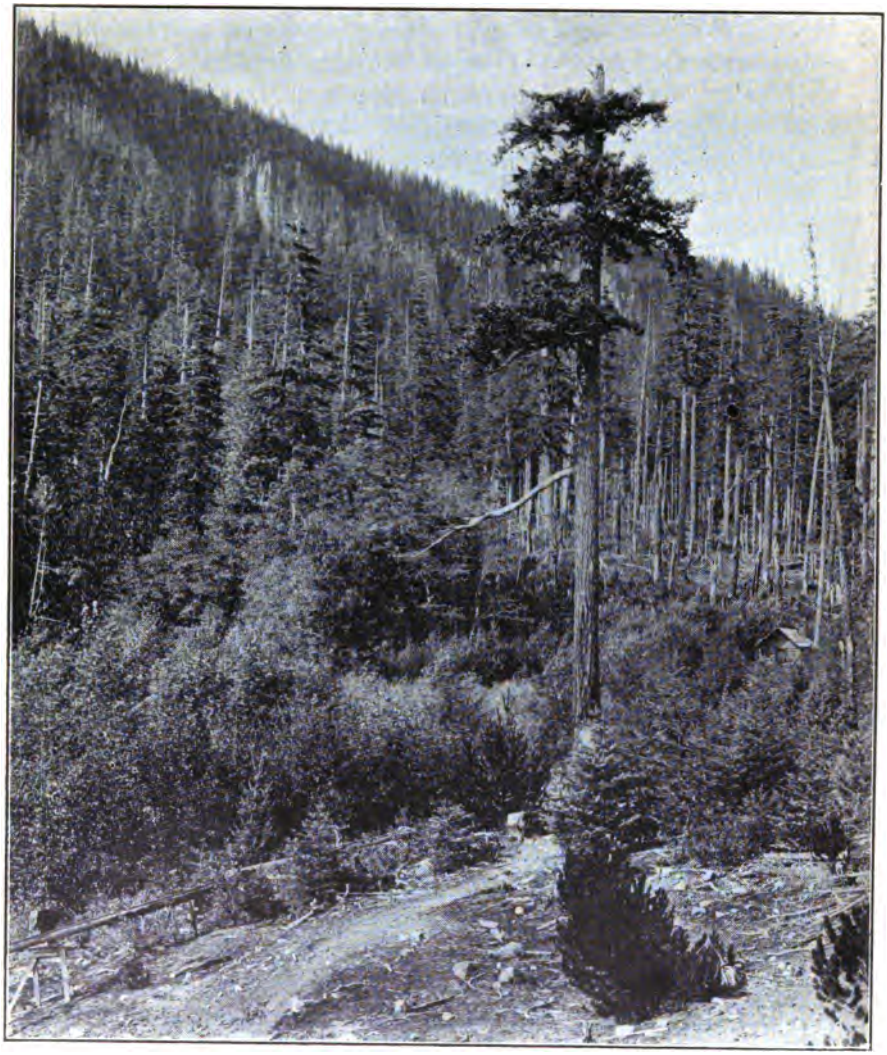
each year shows a larger amount cut and manufactured than ever before.

We cannot lull ourselves into a feeling of security concerning the future of our wood supply on the supposition that the many substitutes for wood will lessen the consumption. The facts absolutely contradict such an assumption. It is true that we build our ships of steel; our bridges of steel and concrete; our skyscrapers of steel, concrete and glass; our dwellings of brick and cement blocks; our railway cars of steel, and in a thousand ways are replacing wood with other materials. Yet the amazing thing is, that the manifold demands of our complex civilization are such that the per capita consumption of wood is still on the increase. We use wood annually at the rate of 260 cubic feet for every one of our 90 million people.

Our forested area will not be materially extended. On the contrary it will doubtless decrease as scientific agriculture brings the lower grades of land into profitable use. When we know that population increases according to a fixed law, and that, with immigration and the natural increase, we will have 200 million people in the country at the beginning of the next century, we are forced to the conclusion that the husbanding of our forests, together with our other natural resources, is an immediate and pressing one.

Referring again to the simple law of supply and demand, in the light of the preceding discussion, it must be clear that the future will show a sharp increase in the demand for forest products, that the prices of all classes of materials will very materially advance and that it is the manifest duty of the nation, the State and the individual to guard against the unnecessary waste of the present supply and to take the necessary steps to insure a supply for the people of the future.

Twenty years ago, timber not adjacent to sawmills or drivable streams had practically no stumpage value. With the gradual development of a home market and the demand for Oregon lumber by other sections of the United States and by foreign countries, there has been, naturally, a steady increase in the valuation put upon standing timber. In some cases the value of unusually accessible tracts of timber lands has increased twenty-fold or more during the past twenty years.



An old clearing, nature reproducing the forest.

Due to the variation of stumpage values of similar timber even in the same township, it is not possible to illustrate the increase in this respect by giving definite figures. The timber on one tract may find a ready market at three dollars per thousand, while a similar stand located in an inaccessible region three or four miles distant would not be marketable at fifty cents a thousand. With the extension of transportation facilities and the increased demand for forest products there will be a further marked advance in stumpage values in the State.

OUR WOOD-USING INDUSTRIES.

The sawmills of Oregon manufacture about two billion feet of lumber each year. About 60 per cent of this material is shipped to points outside the State. The balance is consumed within the State, 500 million feet being used in general building, while the remainder is converted into wood pulp, boxes, doors, etc., in the various wood-working plants of the State.

The value of the material turned out by the wood-consuming factories of the State is estimated at $4,708,731 annually. This output will unquestionably increase very materially with the increase in the wealth and population of the State. It is essential that a wise policy of handling the forest lands of the State be developed in order that a perpetual supply of raw material may be insured for these important industries.

Land skinned and burned. Valueless to the owner or to the State

The following table, compiled in connection with a co-operative study undertaken by the Oregon Conservation Association and the Federal Forest Service shows the relative importance of the wood-using industries of the State:

SUMMARY OF WOOD CONSUMPTION IN OREGON.

Industry	Annual consumption feet B. M.	Per cent of total consumed	Estimated cost*
Pulp	93,367,600	31.46	$ 768,012 00
Boxes	77,946,500	26.27	948,969 00
Sash and doors	43,158,500	14.55	774,847 00
Interior work	22,666,600	7.64	560,414 00
Cooperage	20,685,000	6.97	520,005 00
Boats	14,900,400	5.03	481,924 00
Furniture	9,858,250	3.32	293,518 00
Excelsior	4,320,000	1.46	27,000 00
Baskets and veneers	3,102,500	1.05	39,330 00
Handles	1,854,400	.63	49,957 00
Fixtures	1,585,700	.54	149,539 00
Distillation	800,000	.27	4,000 00
Miscellaneous	694,200	.23	27,237 00
Caskets	470,000	.15	7,520 00
Patterns	379,050	.12	19,403 00
Columns	304,000	.10	7,600 00
Saddles and stirrups	208,500	.07	4,745 00
Matches	200,000	.06	2,500 00
Vehicles	198,200	.06	20,717 00
Pulleys	97,500	.02	1,514 00
Total	296,791,900	100.00	$4,708,731 00

*Cost f. o. b. factory.

THE PRESENT AND FUTURE VALUE OF OREGON'S FORESTS.

"While an accurate census is still lacking, authorities generally agree that Oregon has approximately four hundred billion feet, B. M., of merchantable timber. This estimate is probably conservative, for standards of merchantability become less exacting and vast quantities of wood material now unconsidered will have future value. The government estimates that about one hundred and thirty-five billion, or approximately a third of the total, is in national forests. The other two-thirds, the most valuable and accessible, are mostly in private hands. The State itself owns comparatively little timber, having disposed of most of its educational grant lands.

Board foot figures, however, fail to convey any adequate idea of the tremendous economic importance of this resource. We are further prevented from realizing it because its exploitation has scarcely commenced. We regard our forests largely as a wilderness, or at most as a speculative asset for their owners, instead of computing their function in the early

*Wood-Using Industries of Oregon, by Howard B. Oakleaf. Published by the Oregon Conservation Association, Portland, Oregon.

In the path of the destroyer.

future as producers of community wealth. But the world's demand for timber must inevitably lead to the manufacture and shipment of most of this material within the next fifty years, thus bringing billions of dollars into Oregon. For this reason probably no other resource can approach our forests in distributing new wealth per capita among our population and consequently in upbuilding every industry we have, or may hope to have, in any portion of the State.

Without counting increasing export to other countries, the United States already uses (1908) 40,000,000,000 feet of lumber a year, besides 118,000,000 hewn ties, 1,500,000,000 staves, over 133,000,000 sets of heading, nearly 500,000,000 barrel hoops, 3,000,000 cords of native pulp wood, 165,000,000 cubic feet of mine timbers, 1,250,000 cords of wood for distillation, and 90,000,000 cords of fire wood. One by one the timber states which have met this enormous drain are becoming exhausted. Washington now bears the heaviest burden, but Oregon will soon be called upon.

But while Oregon's stock of four hundred billion is almost incalculably valuable in the light of these figures, it is scarcely more so than our immense area of cut and burned over land. Upon our management of this depends whether we shall continue the period of prosperity permanently. Here again accurate figures are lacking, but it is probable that an area quarter as great as that now bearing merchantable forest is capable of equal production in the comparatively early future. This fact, practically ignored, is of the utmost importance.

Nowhere else is forest reproduction as rapid and certain as in the Pacific Northwest. The same natural influences which made our existing forests the most magnificent in the world will perpetuate them with equal success if given slight co-operation by man; indeed they ask little help but prevention of fire. Saw timber can be grown in forty to sixty years; ties, timbers and piles in less. It is reasonable to suppose that while the quality may be inferior to that of the old forest being used now, timber scarcity will make a second crop equally profitable per acre in sixty years. Our deforested land of today should bring us in a billion dollars within the lifetime of our boys and girls, if we do not deliberately destroy its capability to do so."

Third annual report, Oregon Conservation Commission, p. 10.

THE PEOPLE'S INTEREST.

More than $25,000,000 is expended in Oregon annually on account of the lumber industry. Within a few years this vast sum will be more than doubled because of the reduction in the outside supply and the consequent increased activity in the

On the McKenzie River. A source of future power.

State. Of this immense sum it is estimated that at least 80 per cent is expended for labor and supplies, thus benefiting not only the owner of the stumpage and the mill man, but the laborer, the rancher and the tradesman as well. In fact, the lumber industry exerts a beneficial influence upon practically every gainful business and profession in the State.

Whatever may be the attitude of the individual toward the timberman because of the questionable methods employed by some in acquiring their holdings, the fact remains that the people as a whole have the same interest in protecting the forests and in providing for a future timber supply as they have in protecting the orchards of the State in order to insure the benefit of a future fruit supply, or in adapting measures to eradicate disease in order to perpetuate the livestock industry of the State.

It is true that there are vast corporate and individual holdings of timber within the State, some of which were made possible because unscrupulous investors were able to evade lax and loosely administered laws. It is also likely that the human tendency to evade payment of a just proportion of taxes has been abnormally developed in some timber owners. These, however, are matters for legal settlement and should be considered entirely apart from the property itself. In other words, the value of the forest property to the State is not influenced by the legal status of ownership. Under any conditions, the timber, when manufactured, will add to the material prosperity of the State. It would be short-sighted policy, for any reason, to permit the waste or destruction of property, eighty per cent of which will of a certainty be expended within the State for the benefit of all the people.

PROTECTING THE FORESTS.

For years Oregon has annually suffered great losses through the destruction of standing timber by fire. It is estimated that the stumpage destroyed in the State last year, had it been manufactured into lumber would have been worth $23,000,000. This takes into account only the merchantable material. In addition to it, a great loss was sustained by the destruction of the young growth, which forms the basis of the future stand. Not only the present, but the future forest was damaged.

A settler protecting his home. A lesson from the experience of last year.

Since it has become so clear that the State as a whole has an interest in the forests, the last legislature enacted a law, backed by a liberal appropriation, having for its fundamental purpose the protection of the timberlands of the State from fire.

THE STATE FORESTRY LAW.

The State Forestry law provides for a State Board of Forestry, consisting of the Governor, the head of the Forest School of the Oregon Agricultural College, and five additional members appointed by the Governor on the recommendation of the State Grange, the Oregon Forest Fire Association, The Oregon and Washington Lumber Manufacturers' Association, The United States Forest Service and the Oregon Wool Growers' Association.

The Board of Forestry has supervision over all matters of forest policy and management in the State. All expenditures for any purpose under the forestry act must be approved by the Board. The members serve without pay.

The Board appoints a State Forester, who, under its supervision, executes all matters pertaining to forestry within the State. He appoints and instructs fire wardens, takes such action as the law provides for preventing and extinguishing forest fires; prosecutes for the violation of the forest law; cooperates with landowners, counties, and others in protecting forest lands from fire; and publishes such information on forestry as seems best.

In times of particular fire danger the State Forester has power to appoint and employ special fire wardens and to furnish them with such equipment and assistance as he thinks the public safety demands. The law provides that one-third the expense incident to employing special fire wardens and to providing supplies and equipment, shall be defrayed by the county in which the expense was incurred.

The State Forester is empowered to require timber owners, or others, to burn slash or debris whenever in his judgment it is a menace to adjoining property.

Fire wardens, under this law, are peace officers, with power of arrest for any violation of the forest law.

The period between June 1 and October 1 is declared to be a closed season, during which it is unlawful to set out fire in any slashing, woodland or brushland without written permission from a fire warden. This restriction does not apply to the burning of log piles, stumps or brush heaps in small quantities, under proper personal control, but if such burning is done without permission and damage results, the one setting the fire is deemed guilty under this act, and is subject to a fine of not more than $500 or to imprisonment for a term not exceeding three months.

The same penalty applies to those who build camp fires without clearing the ground properly about them, who leave camp fires burning and unattended and who permit camp fires to spread.

During the closed season all engines of whatever character, which are operated in the vicinity of forest or brush land must be equipped with effective spark arresters.

All slashing following logging must be burned or controlled and all inflammable refuse must be destroyed or removed from the right of way of railroads burning wood or coal. These requirements may be suspended if, in the judgment of the State Forester, such action is warranted.

A willful or malicious setting out of fire renders the guilty party liable to imprisonment in the State penitentiary for a term of from one to ten years.

For the purpose of carrying into effect the provisions of the State Forestry law the legislature made an appropriation of thirty thousand dollars for each of the next two years. This makes it certain that the law will be fullly enforced. It is to the interest of every good citizen of the State to co-operate in the fullest measure with all the agencies for forest protection in order that the great losses in life and property, which have marked the past, may be reduced to a minimum. It is clearly a matter of duty as well as of good citizenship to do so.

FORESTRY FACTS YOU SHOULD KNOW.

Oregon contains one-fifth of the standing timber in the United States. Its estimated value at present prices is $5,000,000,000.

One-third of the stumpage of the State is in the national forests. The balance is in private holdings.

It is the opinion of the most eminent authority on the subject in the United States that forest insects do as much damage to timber as fire. Since about 1,750,000,000 feet, board measure, of timber was destroyed by forest fires in this State last year, the active little bug must have been a very busy fellow to have equalled that record.

The manufacturer of Oregon's forest resource will employ an industrial army, afford a market for our other commodities and in every way tend to the development of a great and prosperous commonwealth. Forest wealth is community wealth. Protection of forest industries is the best form of prosperity insurance a timbered state can buy.

Within a short time Oregon will surpass all other states in the output of its forest products. How long the State will continue to rank first depends on the management of the existing forests. Protection from the great enemy forest fire must be assured before conservative forest management is practicable.

The Federal Forest Service holds over 16 million acres of forest land in this State. This stumpage is for sale.

The policy of the Forest Service in managing the forest land is to insure the continued production of the largest amount of the best timber for the benefit of all the people.

The Forest Service pay 25 per cent of the gross receipts from the forests to the counties in which the land is located, to be applied to the school and road funds.

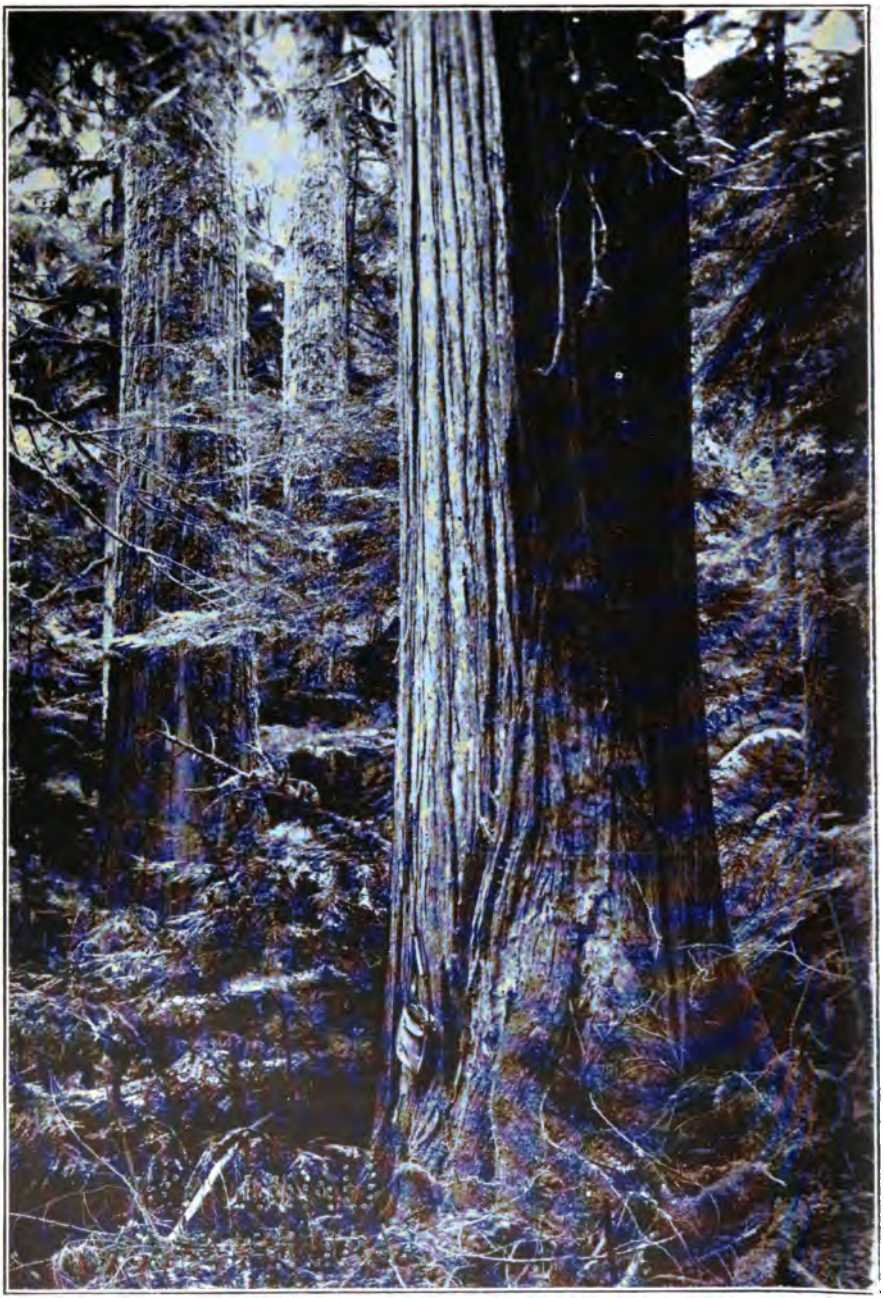
The streams of Oregon are capable of developing over four million horse power in electric energy. More than 4,500,000 acres of land in this State may be brought under irrigation. Both for irrigation and for the development of hydro-electric power, continuous stream flow is essential. A forest cover at the headwaters of the streams is the most important factor in producing this result.

Oregon's Commercial Forests

By GEORGE W. PEAVY, M. F. S.
Dean, School of Forestry
Oregon Agricultural College
Member State Board of Forestry

OREGON STATE BOARD OF FORESTRY
Bulletin No. 2

F. A. ELLIOTT, State Forester



CHARACTERISTIC TRUNK OF WESTERN RED CEDAR

OREGON STATE BOARD OF FORESTRY
Bulletin No. 2
F. A. ELLIOTT, State Forester

OREGON'S COMMERCIAL FORESTS

THEIR IMPORTANCE TO THE STATE

BY
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Oregon Agricultural College

MAY, 1922

SALEM, OREGON:
STATE PRINTING DEPARTMENT
1922

Special acknowledgment is made by the author of this bulletin to the Federal Forest Service. Without the publications and special data of that organization this booklet would not have been possible. Grateful acknowledgment is made to Prof. H. S. Newins for his unselfish service in the contribution of material and in checking the manuscript. Acknowledgment is also made to Allen G. Stover for his splendid work in the preparation of illustrated matter.

GEO. W. PEAVY.

INTRODUCTORY STATEMENT

In presenting this bulletin to the people of Oregon the State Board of Forestry has in mind two things. It is desired to acquaint the citizens of the State with the extent and character of the forest wealth of the State, and, granting that the people secure an understanding of the significance of this information, to suggest a course of action which will insure the perpetuation of its great timber producing and manufacturing industry in the State. The Board of Forestry is fully sensible of its great responsibility to the commonwealth. At the same time it realizes fully the responsibilities of the citizens in the direction of the affairs of the State. The people of the State of Oregon participate as fully in direct legislation as those of any state in the Union. Through the initiative and referendum the people are becoming accustomed to think of State problems and to express their judgment on such problems through the medium of the ballot.

The rapid industrial development of the United States has necessitated tremendous inroads on the natural resources of the nation. Among these natural resources, timber is one which is threatened with early exhaustion unless wise legislative action by the nation and the states is soon taken. Oregon has a larger supply of timber than ony other of the states. Wise legislation can greatly prolong the life of this supply. Oregon has millions of acres of land suited only to timber production. Wise legislation is needed to insure the growing of timber crops on this land. Since the people of the State are fundamentally responsible for the kind of legislation enacted, it follows that they should have full information concerning the factors of the State Forestry problem in order that they may be prepared for wise action. The State Board of Forestry hopes that this publication may supply in part, at least, this information.

History of Forest Depletion.

When the first settlers landed upon the Atlantic seaboard, they found themselves confronted by what appeared to be an unbroken wilderness. As far as they were concerned, it was a limitless forest. It was forbidding and threatening. Beyond the borders of the wilderness lurked wild beasts and savage men. Added to this the trees cumbered the tillable soil from which the settlers must derive their food. Thus the forest was a real foe to their existence. That the forest supplied logs for their cabins, rails for their fences, and fuel for their fires was purely incidental in the conquest of the land for tillage. During more than the two centuries required to make

DESTRUCTION CAUSED BY FOREST FIRE
Fire still burning in the distance

the march of civilization from the Atlantic Coast to the Mississippi, the one great expenditure of human energy in winning the way was in conquering the forests, in felling the trees, burning all except what was needed for immediate use, and clearing the ground for cultivation.

These two centuries of forest destruction explain the development of that peculiar American mental attitude that a forest tree is of small importance, and that the forest is to be used or abused at the pleasure of the individual regardless of ownership. To change this mental attitude, in part only, has required more than thirty years of untiring effort on the part of those who have acquired an understanding of the economic significance of the forest resources to the future of the nation. It is especially gratifying to the friends of forestry that many thinking people, men actively engaged in the lumber industry, as well as professional foresters, have become convinced of the need of formulating a forestry program which will insure an adequate future timber supply and, as a consequence, a comprehensive national forest policy may be anticipated within a reasonably short time.

Before the settlers' ax had begun the removal of the forest to prepare the way for fertile fields, there was a forested area in the United States of about 850,000,000 acres. This vast timbered area has been reduced to less than 463,000,000 acres. More than half of this remaining area has been culled, or is unproductive. In a rough way there are five great forest regions in the United States. This separation of the original forested areas of the United States into regions is based largely upon distinctions of topography and upon the dominant species within the respective regions. It should be understood that certain species of trees appear in more than one region, and that there is no sharp dividing line between regions. In other words, this division into regional areas is largely for the purpose of convenience in description. It should also be understood that in certain of these regions much of the timber has been removed to clear the land for cultivation, or else to supply the demands for lumber in the industries.

The Northern forests cover the northern portion of the Great Lakes region, New York, Pennsylvania, and New England. The white pine is the one tree quite generally distributed over this area. The eastern species of spruce, fir, hemlock, and cedar are among the commercially important trees while hardwoods form a decided mixture with the conifers in many places, especially in the southern portions of the region.

The Southern forests extend from Maryland along the coast to Texas, occupying the larger portion of each of the Gulf states, with the exception of Texas, the eastern portion only of

OLD FOREST ROAD—A GOOD FIRE LINE IN CASE OF SURFACE FIRE

this state being forested. The characteristic trees of the southern forest region are the small group from which the famous southern yellow pine is obtained.

The major portion of the Central Hardwood region lies in the Ohio valley, though broad arms extend along the Appalachian mountains, down into Arkansas, and up into Minnesota. This region is the home of the most valuable broad leaf timber trees in the world. In this area grew the white oak, famous in furniture manufacture, black walnut, the hickories, maples, ashes, chestnuts, and others of less importance.

The Rocky mountain region, as the name indicates, covers roughly the great Rocky mountain territory. In the main the area is sparcely forested. It is rather distinctly divided into two parts. The northern division is characterized by the western yellow pine, lodgepole pine, Douglas fir, and Englemann spruce. The southern division has for its principal trees western yellow pine, juniper, pinon, with some Douglas fir and Englemann spruce.

The Pacific Coast forest occupies the territory west of the Sierra Nevada and Cascade mountains, and extends into eastern Washington, northern Idaho, and western Montana. This is the most densely forested area in the United States, and contains some of the largest and most valuable commercial trees in the world. The principal commercial trees of the region are Douglas fir, western red cedar, western hemlock, Sitka spruce, western white pine, redwood, and sugar pine.

Progress of Forest Removal.

In order that Oregon's economic position with reference to the lumber industry may be better understood, a brief survey should be taken of the progress which has been made in removing the original forests of the country for lumber, for agriculture, and by fire.

The great pine forests of New England and the Lake states are practically cut out. The remnants of these one-time splendid forests are being logged off in Maine and in Minnesota. The New England region ships in about 30 per cent of the lumber which it consumes. The Lake States region which during the eighties and early nineties supplied more than one-third of the lumber produced in the United States now consumes the equivalent of 70 per cent of the total amount it cuts, leaving only 30 per cent for outside shipment. The southern yellow pine region has for the past ten years produced about 40 per cent of the lumber consumed in the United States. The South, however, is past the peak of its production, and, in the future, will produce less and less each year. Experts estimate that, by 1930, the South may cease to be an exporting region,

SLASH FOLLOWING LOGGING
This constitutes a serious fire hazard

for the reason that needs within the region itself will require all the timber produced. This is also the judgment of some of the largest producers of southern yellow pine lumber. The forests of the Rocky mountain area are widely scattered. Much of the timber is in comparatively inaccessible localities. With the growing development of this region, it is unlikely that, with the exception of Montana and Idaho, much more timber will be produced than will be required for local needs. The forests of the Pacific Coast region contain 1,707,000 million board feet of standing timber. This represents more than one-half of the remaining saw-timber in the United States. This statement alone is sufficient to show that the Pacific Coast region is destined to be the great timber producing center of the United States.

Pacific Coast Forests.

As has already been noted, the Pacific Coast forests carry a stand of 1,707,000 million board feet of saw timber. This immense volume of material is distributed as follows: Oregon, 452,000 million feet; Idaho, 98,000 million feet; Washington, 268,000 million feet; Montana, 55,000 million feet; Alaska, 150,000 million feet; British Columbia, 350,000 million feet, and California, 334,000 million feet.

Of the total, Douglas fir, one of the most valuable timber trees in the world, makes up more than one-half, or 581,847 million board feet. The following table compiled from Federal Forest Service data, indicates the relative amounts of the various timber species in the Pacific Coast region:

Douglas fir	581,847,000,000
Western yellow pine and Jeffrey pine	243,771,000,000
Western hemlock	155,614,000,000
True firs	82,479,000,000
Redwoods	73,738,000,000
Sugar pine and Western white pine	78,662,000,000
Western red cedar	154,019,000,000
Spruce	25,954,000,000
Lodgepole pine	4,566,000,000
Western larch	28,197,000,000
Other species	278,143,000,000
Total	1,706,990,000,000

Oregon's Future As a Timber Producing State.

The three Pacific Coast states carry over one-half of the remaining standing timber in the United States. Of these three states, Oregon has 50 per cent more timber than Washington and 60 per cent more timber than California. Compared with the entire United States, Oregon has practically one-fifth of all the standing timber of the country. This vast

stumpage resource, 452,000,000,000 feet, board measure, lies very largely west of the Cascade mountain divide. Under normal conditions less than one per cent of this amount is being cut and marketed annually. Should this rate of cutting remain the same, it is evident that Oregon's timber industries could continue operating at the present rate for a hundred years. If this could be assured, the forestry problem, as far as Oregon is concerned, would not be a pressing one. Oregon, however, must play an increasingly important part in supplying the timber needs of the nation. In performing this proper economic function, it is evident that the rate at which the stumpage is being removed will greatly increase.

The annual timber requirements of the United States approximate 40 billion feet, board measure. Close students of the entire situation do not believe that this annual requirement will be decreased. Wood is one of the great economic necessities. People will do without it for certain uses only under the pressure of extreme necessity. It is true that the per capita rate of wood consumption in the United States is decreasing. In 1906 it was 515 feet. In 1913 it had fallen to 430 feet, and in 1918 to 300 feet. War conditions and high prices no doubt contributed to the rapid decrease from 1913 to 1918. Offsetting very largely the decline in per capita consumption is the rapid increase in population. While the average person is using less the number of consumers is increasing at a sufficiently rapid rate to maintain the average annual rate of consumption for the entire nation. All this is proving out in spite of the many substitutes for wood. A forecast of lumber requirements in the United States is well stated in a recent report made to Congress by the Federal Forest Service.

"The experience of industrial European countries gives some indication of what American future requirements for lumber will be. In England, for example, during the 60 years from 1851 to 1911 the consumption of lumber increased from 40 board feet to 120 board feet per capita, although 95 per cent of her requirements must be met through imports at high cost. Similarly, German home production at least doubled during the 60 years between 1840 and 1900. Industrial development made it necessary to import constantly increasing amounts of timber, and, in spite of the cost of imported material, the per capita consumption at the outbreak of the war was about 150 board feet per annum.

"The United States is still a new country. We still have large areas of undeveloped agricultural land. In much of our territory first construction was of such a character that replacement on a larger and better scale will be desirable if not absolutely necessary. Our population is growing rapidly and

there is no reason to believe that it will not continue to grow. Industrial development in many sections has hardly begun. How large the per capita consumption in industrial centers is may be judged from the fact that in St. Louis the per capita consumption is over four times that for the entire country, in Pittsburg three times, and in Chicago at least double.

"Even with large allowances for the substitution of other materials for timber, it seems hardly possible that our annual demand for lumber for years to come will fall below 35 billion feet. This is 5 billion less than the pre-war average of approximately 40 billion board feet. Even this will require a gradually reduced per capita consumption as population increases. For many years we shall find ourselves unable to satisfy our requirements with anything approaching the per capita consumption of either England or Germany. It follows that any future lumber production falling below approximately 35 billion feet, unless we can make up the difference by imports, will result in hardship to many classes of consumers and to many industries, like that experienced within the last year. Any such reduced consumption will unquestionably be the result of economic pressure from lumber shortages and high prices rather than of economic convenience. We have our warning in the present situation."*

As has been indicated elsewhere, New England and the Lake States have ceased to be important factors in the lumber producing business. The South has passed the peak of its producing activity and some of the foresighted lumbermen, as well as forest experts, believe that in ten to twelve years it will cease to be an active competitor in the lumber producing game outside its own territory. The Rocky mountain forests, with the exception of those in Idaho and Montana, will not be able to supply any considerable amount of material for the great lumber markets of the country. The conclusion is inevitable that, in a very few years, the Pacific Coast states, in proportion to their timber resources, will be called upon to supply a large portion of the timber required in the markets of the entire nation. Oregon, in a few years, will be the most important lumber manufacturing state in the Union.

* Timber Depletion, Lumber Prices, Lumber Exports, and Concentration of Timber Ownership, p. 36, United States Forest Service, 1920.

A Perpetual Forest Industry

The forest wealth of the State of Oregon may be divided into three parts. First, that land which is not now bearing any form of timber trees, young or old, but which is better suited to growing forests than any other crop. Second, immature, non-merchantable forest growth, and the land upon which it stands. Third, the mature, merchantable timber, together with as much of the land which carries it as is absolute forest land. The first is potential forest wealth because the land will finally be put to producing timber. The land and the second growth which stands upon it is wealth because eventually the young stuff will develop into mature timber. The third has a value because the timber can, as economic needs require, be converted into a useful product.

It must be evident to anyone that the land is basic for continued forest production in exactly the same sense as it is for continued wheat production. The forest is a crop. Man or nature sows the forest crop. It grows to maturity and it is cut for man's use. The soil is again released for a new crop. It has been stated elsewhere in this publication that because of the forest industry of the State $75,000,000 is circulated annually through the various channels of business, and that 40,000 workers find employment because of the industry. It has also been pointed out that every economic consideration indicates that within a few years these figures will be greatly increased. If we assume that wood is one of the great human necessities, and if it is admitted that Oregon has within the limits of the State a vast area of land good for nothing except the growing of forest trees, and if, as is evident beyond question, manufacturing the product from this land can provide employment for thousands of laborers and can add millions of dollars to the wealth of the state, it seems reasonable that earnest consideration should be given to the perpetuation of an industry which can be made such a considerable factor in the industrial future of the State.

At the present time Oregon possesses certain unique advantages over any other state in the matter of insuring a perpetual timber supply. The State has a vast reservoir of mature timber; in fact, more merchantable timber than any other state in the Union. The State has an immense area of second growth in all stages of development. If protected from fire much of this material will be ready for the saw when the mature timber is gone. The younger stuff will mature at later intervals. Finally, the burned-over and cut-over land, if systematically planted up, will produce mature timber when the present second growth has matured and has been harvested.

Of course the problem is not so simple of solution as these statements would make it appear. Nevertheless, the logic of the thing is evident and can not be denied.

At the present time Oregon is cutting about 100,000 acres of forest each year, and 2,565,000,000 feet, board measure, of timber. In considering these rates of cut, the following tabulations will be of interest:

AREAS OF COMMERCIAL MATURE TIMBER

Ownership	Acres Western Oregon	Acres Eastern Oregon	Total
Private	5,892,000	3,290,000	9,182,000
State	48,000	30,000	78,000
Indian Res., Nat. Forests and Unres. Public Domain	1,000,000	997,000	1,997,000
National Forests	3,000,000	4,494,000	7,494,000
Total	9,940,000	8,811,000	18,751,000

VOLUME OF MERCHANTABLE TIMBER
(Thousand feet, B. M.)

Ownership	Western Oregon	Eastern Oregon	Total
Private	229,900,000	45,100,000	275,000,000
State	1,650,000	330,000	1,980,000
Indian Res., Nat. Forests and Unres. Public Domain	49,500,000	12,100,000	61,600,000
National Forests	92,510,000	49,720,000	142,230,000
Total	373,560,000	107,250,000	480,810,000

If the present rate of cut were to be maintained it is evident that more than one hundred years would pass before the existing mature stand of timber would be cut off. Due to the depletion of timber supplies in other portions of the United States, as is pointed out elsewhere in this bulletin, timber requirements, which have been met in recent years very largely from the south, must soon come in rapidly increasing quantities from the Northwest. Everything considered, it appears safe to predict that privately owned timber in Oregon will be practically exhausted in twenty-five years, and considerable inroads will have been made in National Forest stumpage.

It will be of interest to the citizens of Oregon to consider just what the logging, milling, and manufacture of this vast store of mature stumpage will mean, economically, to the State. Let it be assumed that, during the next 25 years, only 350 billion of the total of 480 billion feet of Oregon timber is cut. This will mean an average annual cut of 14 billion feet, an amount

which is over five and one-half times the present annual cut. If $75,000,000 in wealth is now circulated yearly by the lumber industry throughout the State, an average of more than $412,000,000 will, during the twenty-five year period, be circulated annually through the State on account of the industry, and, on an average, more than 200,000 men will be employed by it. However, no one who has studied the economics of the lumber industry will admit for a moment that lumber prices will remain at the present level. This is the verdict of lumbermen, of economists, and of professional foresters generally. With the lessening of the timber supply the price will certainly advance, and an amount far in excess of that indicated will annually be added to the wealth of the State. The purpose of quoting these figures is to show the tremendous active asset which the lumber industry is to the State, and to indicate the desirability of perpetuating it. The full force of the national demand for lumber from the stumpage supplies of the Pacific Northwest will not be felt until the southern pine, the chief competitor of Douglas fir, has been nearly exhausted. Economic factors indicate that during the next ten years there will be a gradual increase in the demands made upon the Northwestern states for lumber, due to the gradual depletion of southern stumpage.

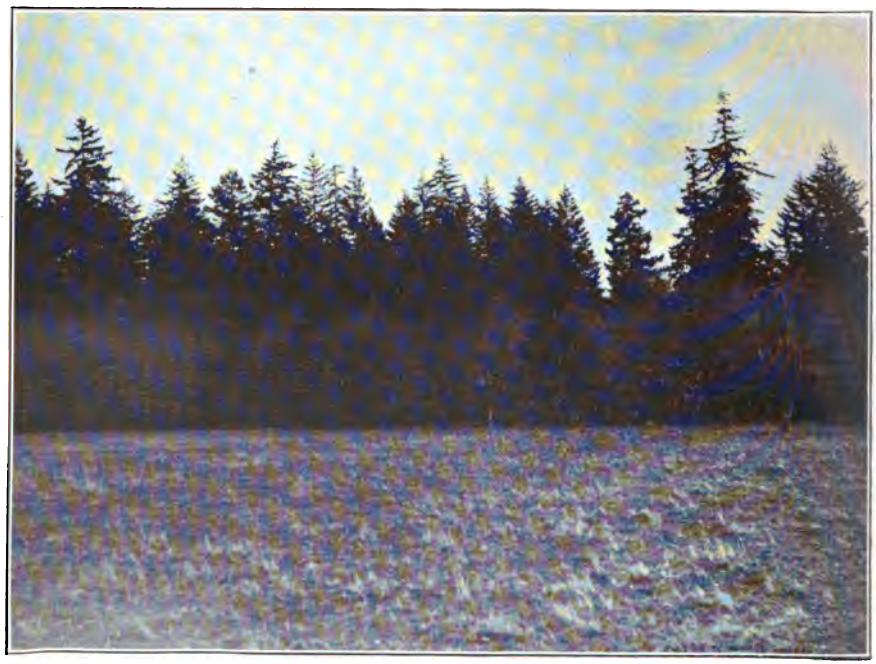
At the present time western Oregon has an area of more than 2,500,000 acres of second-growth timber in all stages of development, from very small stuff to that approaching maturity. This constitutes a future source of wealth if the State will assume fully its manifest responsibility of excluding fire from these immature forests. If none of this second-growth were to be cut within twenty-five years, and then the present rate of cut, 100,000 acres per year, were to be maintained for the following twenty-five years, it is evident that no material under 50 years of age would need to be cut for the reason that logging could begin in what is now the oldest second-growth timber, much of which is now far in advance of twenty-five years. Investigations show that these second-growth forests can produce an average of 36,000 board feet, board measure, per acre, in sixty years. If the present acreage rate of cut were maintained in the removal of this second-growth, the annual yield would be 3,600,000,000 feet, board measure. This would be more than a billion feet in excess of the present annual cut. Even a casual consideration of these figures, which should be thought of in connection with future increases in lumber prices, can not fail to impress one with the great economic value to the state of the second-growth forests, and of the importance of seeing to it that these immature timber crops are brought to maturity.

Thus far in the discussion of a perpetual forest industry an attempt has been made to show the part which the present stand of mature timber and second-growth, or immature forests, can play in bringing about that desirable end. The question must now be examined from the viewpoint of systematic forest replacement on cut-over, and burned-over, forest land. Lumbering manufacturing industries can not be maintained unless a continued supply of raw material is available. Continued supplies will be available only under a definite and comprehensive system of forest management, including necessary forest planting, and adequate forest protection. By wise and careful use the present stands of mature and immature forest can be made to serve as a stop-gap between the present and the time, sixty years hence, when forests planted now will be ready for cutting.

Estimates made by the Federal Forest Service and the State Board of Forestry indicate that in the Douglas fir region of western Oregon, there is an area of at least 10,000,000 acres of land which is distinctly forest land. This land has no present, or prospective, agricultural value. Under management, this area should yield approximately 600 feet board measure per acre per year. In the yellow pine region there is an area of 5,000,000 acres of absolute forest land. The average annual growth rate on this land is estimated at 100 feet board measure. In the Douglas fir region the average total annual production would be 6,000,000,000 feet, and in the yellow pine region 500,000,000, or a total production of 6,500,000,000 feet. This represents a volume of material more than twice that of the present average annual cut. By the most conservative estimates this will mean circulating annually through all the channels of trade in Oregon more than $150,000,000, and it will mean the permanent employment of more than 80,000 men. No patriotic citizen of Oregon can question the desirability of placing an industry of this magnitude upon a permanent footing.

From the figures given in the preceding paragraph, it appears that two-thirds of the acreage of the absolute forest land of the State lies west of the Cascades. On the basis of productive capacity, over 90 per cent lies west of the mountains. In other words, over 90 per cent of the total volume of timber will be produced on the west side when the present forest crop is cut and all the actual forest land is growing timber. The fact that this vast area of forest land of high productivity is thus located is decidedly fortunate, for the establishment of a new forest after the removal of the old is comparatively simple in this region. For the most part satisfactory reproduction will follow if the slash is burned in the spring, and fire is kept out

thereafter. At the same time, the potential forest land which is not satisfactorily restocking should be systematically planted up. Just how, and when this big program is to be made effective, is a matter for future determination. The working out of the problem will require the best thought and active cooperation of many people. One thing is certain: there must be a decided change in our attitude toward our timber resources. We have treated our forests as we would a mine. We have skinned out the timber as a miner would take out ore. When the usable timber had been taken out we have abandoned the works. We have ignored the fact that a tree grows, in the same sense that wheat grows. The forest is a renewable resource. In the interest of the nation and of the State, Oregon's forests should be renewed; and, by all means, there should be as little delay as possible in making a beginning.



DOUGLAS FIR SMOTHERING A STAND OF SCRUB OAK

DOUGLAS FIR

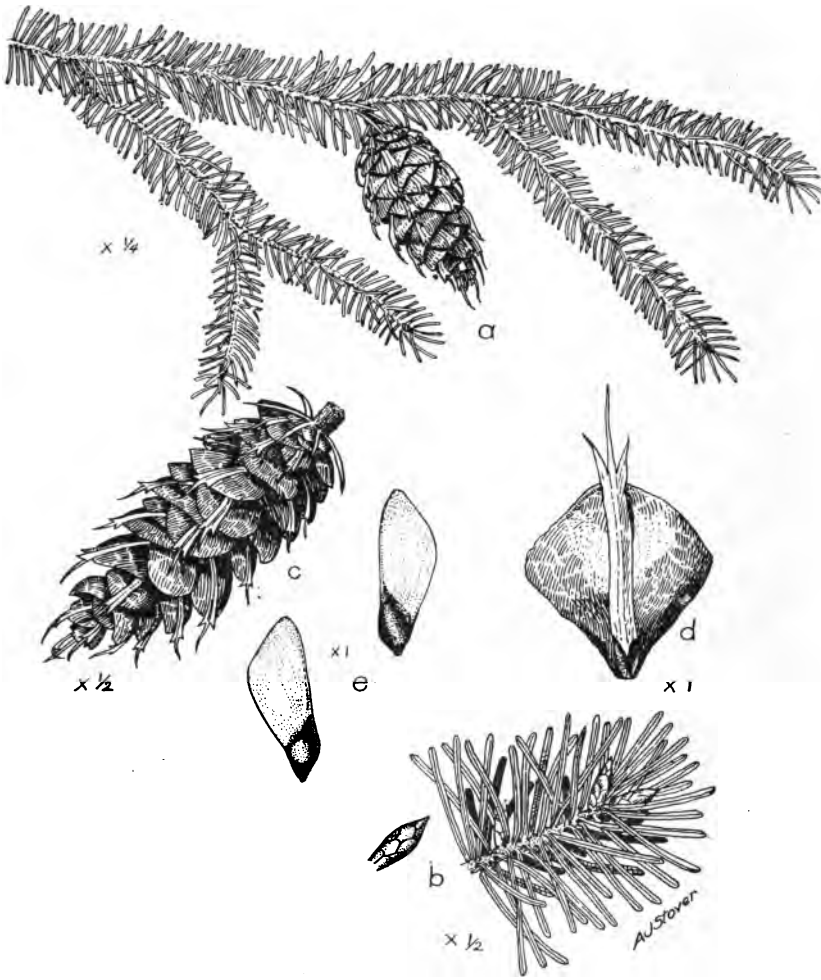
Pseudotsuga taxifolia (Poir.) Britt

FIELD CHARACTERISTICS: Cones pendulous, two or four inches long, and with three pointed bracts extruded beyond the cone scale; leaves one inch long, neither grooved on surface nor notched at end, distributed in whorls on twigs rather than forming flat sprays; winter buds one-fourth inch long, slender, and pointed; bark soft in texture, easily cut with ax or knife, and, on mature trees, deeply furrowed.

Douglas fir, like its chief commercial rival, southern yellow pine, is known by a variety of colloquial names. Unlike the latter, it is represented by but one species, *Pseudotsuga taxifolia.* The names most commonly used, aside from that already mentioned, are: red fir, yellow fir, Douglas spruce, and Oregon pine. The name "Douglas fir" is the one recognized by the Federal Forest Service, and is especially appropriate because it honors the name of that hardy pioneer, David Douglas, who withstood the rigors of an unexplored country and, in 1872, made known to the world this tree which later was to play such an important part in the industrial development of America.

The exploitation of Douglas fir has progressed rapidly in the accessible regions of the Pacific Northwest. The bulk of the remaining timber of this species is in mature stands, where large veterans make up a dense forest. These mature trees are called yellow fir by the woodsmen because they produce lumber with a bright yellow hue which, on account of the slow growth of the tree is very fine grained and relatively soft. The lumber from these mature "yellow fir" trees goes on the market as high-grade fir lumber. The bark on the old trees is heavily furrowed and very thick, frequently being 10 to 12 inches through; in fact, one specimen has been found with a bark thickness of 20 inches.

Where the ax of the lumberman or the ravages of fire, insects and diseases have interfered with the original forest, there frequently occurs new even-aged stands of Douglas fir, popularly alluded to as "second-growth." The trees in these stands may be of any age up to 200 years and are characterized by a comparatively thin bark, usually not exceeding two inches in thickness, and not deeply fissured. Diameter and height growth has been rapid and a coarse-grained wood is produced which is hard and tough in texture and of a reddish color. These second-growth stands are so distinct from the mature forests of Douglas fir that the names "second-growth" and "red fir" have been commonly applied to them. These terms are also applied to the fuel and the lumber which is derived from these immature stands. In contrast to second-growth



DOUGLAS FIR (*Pseudotsuga taxifolia*)

a. Fruiting branch showing pendent cone with extruded bracts.
b. Detail and arrangement of leaves and winter buds.
c. Matured cone with reflexed scales.
d. Outside of cone scale showing the slender acutely lobed and extended bract bearing a spear-like point in the notch.
e. Winged seed showing two sides.
(*x* indicates scale of reduction.)

the term "old-growth" is used with reference to the more mature stands, and is also commonly employed in connection with cord wood products derived from them. It is evident, then, that the trunks of these old trees may contain within their centers wood with characteristics of the red fir. This wood, of course, represents the result of the earlier growth. Thus red fir and yellow fir may be found in one and the same tree.

Two forms of Douglas fir are found; that growing in the Pacific states, and that native to the Rocky mountain region. Douglas fir is found growing over a wider area than that indicated by any other tree. It ranges from latitude 55 degrees north, in Canada, southward throughout the Coast, Cascade, Sierra and Rocky mountain regions, to latitude 23 north, and within these regions from the Pacific to the Continental Divide. It is found from the sea level regions of Puget sound and the lower Columbia, to an elevation of 9,000 feet in the San Francisco mountains of northern Arizona. In many parts of this wide distribution it occurs in dense, pure stands, which are the result of fire, windfall, or some other factor of destruction to the preceding forest.

Trees of this species are frequently found reaching 250 feet in height and 5 feet in diameter. The maximum height recorded is 380 feet, which equals that of the redwood.* There is on record one tree which scaled 60,000 feet board measure.† The average stand produces 35,000 to 60,000 feet board measure per acre, although as high a yield as 500,000 feet board measure has been obtained. The largest diameter on record is that of one which reached 17 feet at stump height.† The Oregon flag pole, a single fir stem erected at the Exposition grounds, San Francisco, measured 299 feet 7 inches in length.

Douglas fir occurs throughout the western part of the State of Oregon, with the exception of a few dry valleys, and grows from sea level to an elevation of 6,000 feet and sometimes as high as 7,200 feet. In the eastern part of the State, it extends up the Columbia river valley as far as Hood River. It is found east of Mt. Hood, but not beyond the Deschutes river, nor extending southward much beyond the town of Wapinitia. In southern Oregon it is common to the Coast, Umpqua, and Cascade mountains, but is not observed on the divide between the Deschutes and Klamath rivers.

The best development of Douglas fir is found in the coast region where there is an abundance of soil moisture. The tree is not exacting, however, and does well on a great variety of soils, including those of clay, gravel, and volcanic origin. In soils where the water table is low, the root system penetrates

* Frothingham, E. H.: Douglas Fir (U. S. For. Ser. Cir. 150, p. 28, 1909.)
† Goss, O. P. M.: Structural Timber Handb. West Coast Lbr. Ass'n, p. 5, Frontispiece.

deep into the soil. It follows that trees of this character are relatively free from windfall. On alluvial soils, such as are common to the coast region, the roots grow close to the surface and spread themselves over great distances. It is here that windfall may occur because the roots do not have firm anchorage in the soil. In dense stands of this character the root systems of the respective trees come into close contact and often graft themselves together in a most interesting manner.*

On the best soils the growth of the little seedlings is rapid. They make on an average about four inches the first year, and more than twice this amount the second. When the trees become firmly established, at an age of six to ten years, annual leaders four feet in length are not uncommon. Both diameter and height growth continue to be relatively rapid during the first hundred years. The trees produce long, clear, straight boles where they grow in the denser forests, and a more rugged stem with excessive taper and carrying a full crown with great outstanding branches, where they grow in the open. In the coast forests the average age of the veteran trees is perhaps 400 years. Ring counts have been made on single stumps showing an age of more than 700 years, and it is not improbable that in exceptional cases this tree has reached a maximum age of 1,000 years.

Douglas fir, although growing most frequently in pure stands, associates with other species to some extent. It mingles most commonly with the western hemlock and western red cedar, which are found in the moist dark recesses of the coast forest, and with the tideland spruce along the coast. In the Sierras it is found in mixtures with sugar pine, western yellow pine and white fir. In the Rocky mountains the white and Alpine firs are frequently associated with it. Douglas fir is not very tolerant of shade. On the whole the associated species can endure more shade but the ability of the Douglas fir to grow in dense stands, provided there is top light, enables it to persist as the dominant tree of the forest.

The thick bark on matured trees is a great protection from fire. Whole forests may be observed where fire has killed every hemlock in a mixture of hemlock and fir, because of the thin bark of the hemlock and its more exposed root system, while the Douglas fir has not been seriously injured. Frequently, however, crown fires do considerable damage to Douglas fir, especially after a hot, dry season.

The most serious insect enemy of Douglas fir is the bark beetle (*Dendroctonus pseudotsugae*, Hopkins). This beetle works between the outer bark and the wood, thus ultimately

* Newins, H. S.: "Natural Root Grafting Conifers." (Proc. Soc. Am. For., vol. 11, no. 4, pp. 394-405.)

girdling the tree. The larvæ of the Douglas fir pitch moth (*Sesia novaroensis* Hy. Edw.) also causes many defects ordinarily believed to be due to lightning, windshake, frost, blazes, and fires. Mistletoe (*Razoumofskya douglasii*, Engelm.) attacks the Douglas fir in some localities, and, by the development of large brooms on the crowns of the trees, causes death. Perhaps the most frequent disease of the Douglas fir is the fungus commonly referred to as "punk" or "conch" and known technically as *Trametes pini*. This fungus probably causes four-fifths of the destruction brought about by the wood destroying fungi of the United States.

Douglas fir produces large quantities of seed nearly every year, but at frequent intervals there occurs an especially large seed crop. Douglas fir has been observed producing an abundance of cones when only seven years of age. Mature, open-grown trees are especially prolific in seed production. The seed will not readily germinate on moist duff and litter such as are preferred by hemlock and cedar, but must have well-drained, bare, mineral soil, and no dense shade. Natural reproduction is abundant after fires. Seedlings are easily handled in seed beds, and are grown and used extensively by the Forest Service in its reforestation work. Foresters have demonstrated that the seed will retain its vitality for several years covered by the moist litter of the forest floor. This peculiarity of the tree is now recognized as of vital importance in the replacement of new stands on logged-off areas. If the slash from logging is burned the first spring following logging the fire is not severe enough to consume the seed stored in the lower portions of this ground cover. Accordingly dense stands of seedlings spring up after this slash fire, and the future forest is assured if the area is properly protected from fire thereafter.

It is interesting to note that trees grown from Douglas fir seed inherit the traits of the parent tree. The seeds collected in the coast region produce rapid-growing specimens capable of assuming enormous proportions, whereas seeds collected in the Rocky mountain region produce slow-growing trees sufficiently hardy to withstand the severe extremes of climate to which the parent tree has been subjected. Both forms have been grown in the mild climate of England and when growing in the same vicinity have afforded excellent comparison. In the eastern United States, only the Rocky mountain form can be grown successfully, because of the late frosts of the spring and early freezing weather in the fall.

It has been shown that the wood of Douglas fir varies with the age of the tree and the rate of growth. The "old-growth" yellow fir is sought after for "finish" lumber to be used upon

the interior of residences. It is fine-grained, free from defect, and easy to work, making possible the beautiful panels used for walls and doors when the lumber is slash sawn. It is admirably adapted for use in ceiling, flooring, and partitions when quarter sawn; in fact, more Douglas fir is used for general mill work than the lumber industry employs from any other species. Douglas fir is supreme in the production of extra long, clear, straight-grained timbers for structural uses, such as bridges and general construction work. It is used more extensively than any other wood for tanks and silos and for wooden pipes. Its adaptability for ship building is so general that hulls of vessels constructed during the World war, even so far away as the New England states, were made of Douglas fir. In the absence of an available supply of spruce this reliable tree supplied a great proportion of the aircraft woods used during the war for making wing-beams, longerons, struts, and engine bearers.

The closest competitor to Douglas fir in the distant markets is long-leaf pine (*Pinus palustris*, Mill.) a tree which is not only very limited in general range and local occurrence in a region where its exploitation is nearing completion, but one which is of slow growth and restricted in size to a maximum of 130 feet and a maximum diameter of 3 feet. These are facts which are of vital importance not only when the harvesting of the present stand of Douglas fir in the Pacific Northwest is considered, but also when one contemplates the growing of other crops of timber on the millions of acres of land in this region which is adapted only to forestry purposes.

More standing timber of Douglas fir exists than that of any other single species. The Federal Forest Service estimates the total stands of Douglas fir as follows:

British Columbia	76,573,000,000 board feet
Washington	132,051,000,000 board feet
Oregon	255,342,000,000 board feet
Montana	12,100,000,000 board feet
Idaho	20,781,000,000 board feet
California	85,000,000,000 board feet
Total	581,847,000,000 board feet

From these figures it will be noted that the State of Oregon has within its borders nearly one-half of the total stand of this valuable timber tree.

In 1920 the total cut of Douglas fir in the United States approximated 6,960 million feet board measure. Of this amount 33 per cent was produced in Oregon and 60 per cent in Washington. Within Oregon the most active logging operations in Douglas fir are in the lower Columbia, Willamette valley, and Coos bay regions.

WESTERN YELLOW PINE

Pinus ponderosa Lawson

FIELD CHARACTERISTICS: Forest grown trees, clear, cylindrical trunks, open crowns. Open grown trees carry limbs close to ground. Bark of young trees, blackish with narrow furrows, on mature trees broad plates, russet-red. Leaves 3 in whorl, 4 to 11 inches long. Leaves fall about third year. Cones mature second season, 3 to 5 inches long, shiny, reddish brown when mature and fallen.

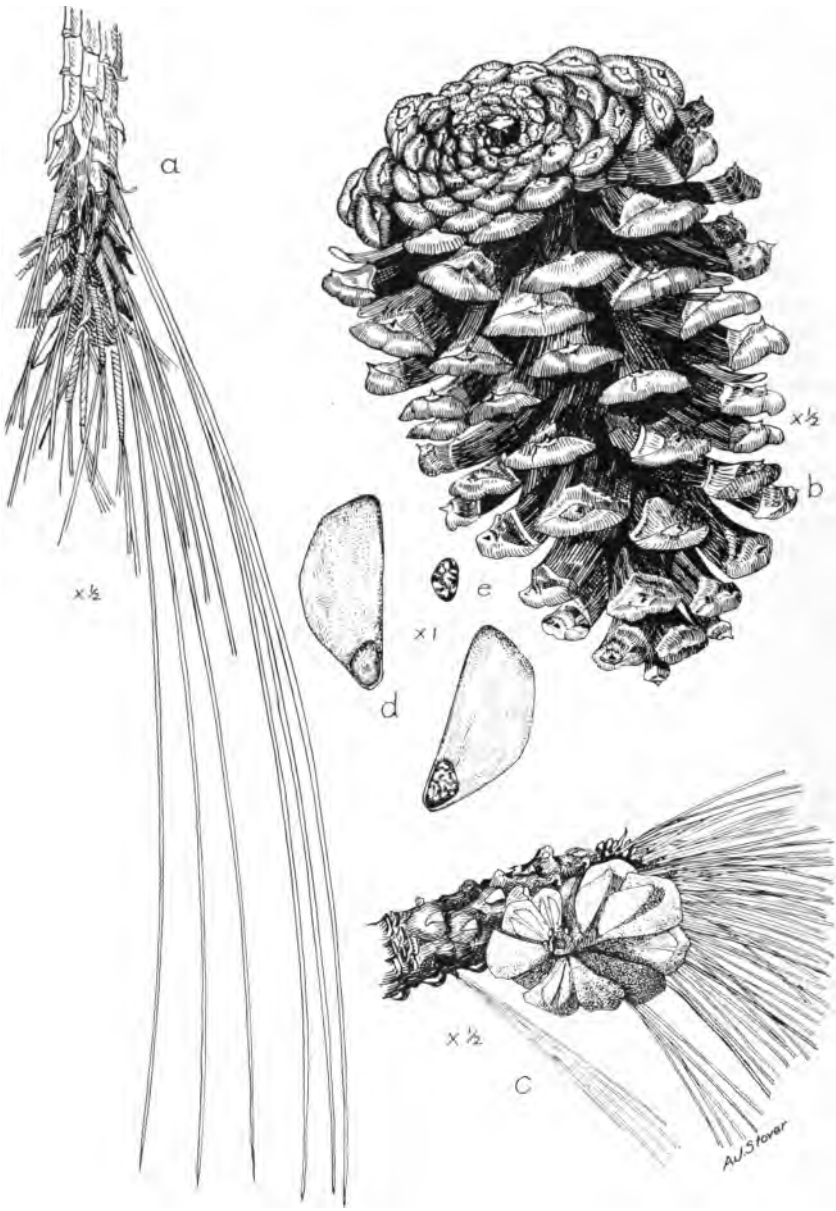
Western yellow pine has the distinction of being the most widely distributed of any member of the pine family. It extends from southern British Columbia south through the region west of the Rocky mountains to northern Mexico. In the north it breaks over the Continental divide as far east as the Black hills of South Dakota. In Washington and Oregon it is found chiefly east of the Cascades. In Oregon scattered stands are found in the lower valleys between the Cascades and the Coast range mountains. These stands become of minor commercial importance in Josephine and Jackson counties. The chief commercial stands of western yellow pine in Oregon are in the valley of the Deschutes river, in Klamath basin, and in northeastern Oregon.

This species endures a wider range of physical conditions than any other pine. It grows from sea level up to an elevation of 8,000 feet and from regions of high annual rainfall to those which are semi-desert. It is found on deep alluvial soil and endures in situations so rocky that there are barely enough crevices to give anchorage to the roots. A light, sandy, well-drained soil is needed for the best development of the tree. Its preference for sites of this character is indicated by the suddenness of its appearance east of the crest of the Cascade mountains.

Because of the high-grade material cut from mature western yellow pine, and because of an early prejudice against yellow pine lumber, lumber cut from this species was put on the market under the trade name of western white pine. To avoid confusion with the true western white pine (*Pinus monticola*), lumber from the latter species goes to the trade quite generally as Idaho white pine.

The tree grows in stands which contain but a small percentage of other species. It is common to find in these nearly pure stands trees of matured growth mingling with bodies of younger timber. The younger stuff is frequently called "black jack" and "bull pine." Bull pine is the name ordinarily applied to specimens with dark, rough bark and thick sapwood.

Because of their moderate tolerance of shade, young trees do not thrive without top light and therefore the forest is open



WESTERN YELLOW PINE (*Pinus ponderosa*)

a. Detail of twig showing leaves, three in a bundle and with a persistent sheath at the base of each bundle.
b. Detached matured cone showing reflexed scales with heavy tips.
c. Sketch showing "broken cone" features.
d. Winged seed, both sides.
e. Seed without wing.
(*x* indicates scale of reduction.)

in character. The tree suffers serious injury through the attacks of insects, particularly those of the bark beetle. Since it is a prolific pitch producer, and because its bark is comparatively thin, there is much damage by fire. The name "cat face" is commonly used to designate the defect caused where ground fires have repeatedly burned at the base of the tree. It has been estimated that 40 per cent of the butt logs are fire scarred.

This tree attains a maximum size of 8 feet in diameter and 230 feet in height, and is known to have reached the age of 687 years. The average size of the mature trees in the commercial stands of Oregon is about 3½ feet in diameter and 110 feet in height. The bole of the tree is long, full, and clear, and in dense stands the crown is restricted to the upper one-third of the stem, but with open grown trees the crown extends down two-thirds of the trunk. The crowns of the young trees are decidedly conical, but as the tree advances in age and size it becomes open and rounded. The tops of matured trees have a tendency to flatten out. Yellow pine grows in mixtures with Douglas fir, white fir, sugar pine, lodgepole pine, and incense cedar.

The total stand of western yellow pine is estimated to be 243,771,000,000 feet, board measure. Recent Forest Service estimates indicate that approximately 100,000,000,000 feet of this amount is in Oregon. The average yellow pine stand runs about 7,000 feet per acre. The 1920 cut in the State approximated 630 million board feet. In 1917 the Forest Service published the table given on page 28, which shows the stands of yellow pine in 18 counties of the State. These estimates are decidedly conservative since, as is indicated above, recent Forest Service estimates place the total stand for Oregon at approximately 100,000,000,000 feet. The figures are valuable in that they show the exact location of the commercial stands of yellow pine in the State, and the approximate amount in each locality.

OWNERSHIP AND STAND OF YELLOW PINE IN OREGON BY COUNTIES

County	Privately owned yellow pine timberland		Government yellow pine timberland		Total	
	Acres	*Feet, B. M.*	*Acres*	*Feet, B. M.*	*Acres*	*Feet, B. M.*
Baker	213,168	1,536,000,000	306,064	1,345,000,000	519,232	2,881,000,000
Crook	535,346	6,847,900,000	638,115	6,415,000,000	1,173,461	13,262,900,000
Curry	59,520	45,400,000	493,721	55,300,000	553,241	100,700,000
Douglas	.....	.....	.....	.....	.....	20,000,000
Grant	301,820	2,853,000,000	884,200	5,315,000,000	1,186,020	8,168,000,000
Harney	36,960	339,000,000	315,335	2,285,000,000	352,295	2,624,000,000
Hood River	6,000	18,000,000	4,000	12,000,000	10,000	30,000,000
Jackson	592,751	5,431,000,000	31,840	223,000,000	624,591	5,654,000,000
Josephine	773,927	721,600,000	363,327	296,800,000	1,137,254	1,018,400,000
Klamath	836,750	7,393,000,000	994,000	10,725,600,000	1,830,750	18,118,600,000
Lake	301,539	3,340,000,000	569,232	5,500,000,000	870,771	8,840,000,000
Lane	.....	.....	.....	.....	15,000	40,000,000
Morrow	112,200	777,000,000	25,000	143,000,000	137,200	920,000,000
Umatilla	32,200	275,000,000	35,000	233,000,000	67,200	508,000,000
Union	235,640	1,561,000,000	119,800	395,000,000	355,440	1,956,000,000
Wallowa	171,330	1,808,500,000	517,156	1,525,000,000	688,486	3,333,500,000
Wasco	40,000	280,000,000	145,000	920,000,000	185,000	1,200,000,000
Wheeler	198,875	1,586,000,000	101,690	1,101,000,000	300,565	2,687,000,000
Total	4,448,026	34,812,400,000	5,543,480	36,489,700,000	10,006,506	71,362,100,000

The wood of mature western yellow pine is fine grained, light, and with very little resin. It is a valuable wood for interior finish and makes excellent sash and doors. It is used extensively in the manufacture of boxes for shipment of fruits. Exposed to the weather or placed in contact with the soil it is not very durable. However, it takes paint well, and hence when painted is serviceable for siding and other exterior uses.

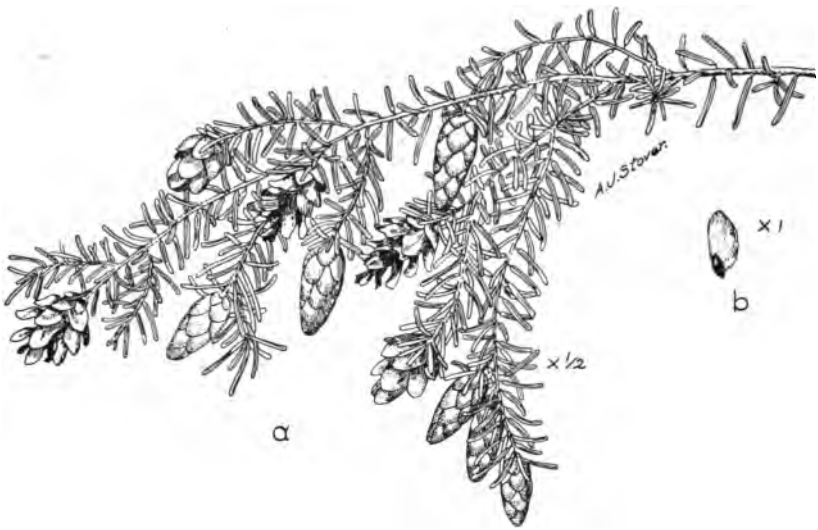
WESTERN HEMLOCK

Tsuga heterophylla Rafn. Sargt.

FIELD CHARACTERISTICS: Inclined to be limby except in dense stands. Shade enduring. Small branches pendulous. In young trees, top drooping; bark smooth, russet-brown. In mature trees, bark one to one and one-half inches thick, dark russet-brown, deeply furrowed. Leaves flat, rounded end, one-fourth to one inch long. Cones abundant, pendulous, three-fourths to one and one-fourth inches long. Seed small with comparatively large wing.

Western hemlock is one of the most valuable trees of the Pacific slope. It is found growing in dense stands throughout the region. The name "hemlock" is usually applied to the eastern relative, used so commonly for joists and timbers in building construction; hence the name "western hemlock" for the former. The western tree is far superior in its intrinsic qualities, but, because the dense stands are far removed from the center of lumber distribution and because the trade has not been thoroughly educated to its many uses, the wood is not utilized as advantageously as it should be. The name hemlock seems to prejudice many consumers against this species because of a recollection of the eastern hemlock and its tendency to splinter, warp and twist. The western hemlock, however, does not reveal these bad traits. In 1920 Oregon produced 89 million of the total 584 million feet of hemlock cut in the west.

This tree is found in great abundance in the coast region of southern Alaska, British Columbia, Washington and Oregon. In British Columbia it extends up the valley of the Fraser and of other rivers to the south, to the limit of abundant rainfall. It is found on the Selkirk and Gold ranges, and as far eastward as Kicking Horse pass, on the western slope of the Continental divide. It reaches as far southward as Marin county, California, to a point just south of Cape Mendocino. In Washington this tree extends across the state and reaches eastward to the western border of the Rocky mountains in northern Montana, and to the Cœur d'Alene in Bitter Root mountains of Idaho. From the coast the tree ranges in Oregon to the western slope of the Cascade mountains, and as far southward



WESTERN HEMLOCK (*Tsuga heterophylla*)

a. Fruiting branch showing ripened cones with reflexed scales and also showing unopened cones. Note peculiar twist at the base of each leaf stem.
b. Winged seeds.
(*x* indicates scale of reduction.)

in the Cascades as the northern base of Huckleberry mountain in the valley of Union creek, and about 12 miles southwest of Crater lake. It is noted locally at Lake of the Woods (T. 38 S., R. 6 E., W. M.). It is not found in the Siskiyous.

Western hemlock is a moisture-loving tree and grows best where there is an abundant water supply. When in the interior and removed from regular and abundant rainfall, its roots strike deeply into the soil in quest of moisture. Ordinarily, however, the root system is wide-spreading and superficial, a condition which subjects the tree to occasional damage from windfall and surface fires. This tree thrives in the dense, deep forests of the Pacific coast where the duff and litter are deep and where there is heavy growth of underbrush. Indeed, it is not an uncommon sight to see small hemlock trees perched high up on top of some moist snag where the small seeds have found favorable conditions for germination.

The common associates of western hemlock in the forest are western red cedar in the bottoms and moist pockets, Sitka spruce in the tideland regions of the coast, and Douglas fir elsewhere with a mixture of grand fir, and numerous other trees of lesser quantities in the valleys. Western hemlock is very tolerant of shade. Like any species of trees, hemlock prefers sunlight, providing other exacting factors, such as

moisture, are not disturbed, but this tree is gifted with the ability to endure shade, and when crowded can even continue to grow with but very little top light.

Western hemlock is one of the most beautiful of all the western conifers. To be sure it lacks the stateliness of Alpine firs, but, on the other hand, it has not their stiff, rigid appearance. The hemlock is graceful with its fine lacey foliage and drooping branches. It may always be identified by the tips of the branches, especially by the gracefully drooping leader.*

Western hemlock is rather slow growing, both as to diameter and height. It attains a maximum size of 8 feet in diameter by 200 feet in height, mature trees averaging 3 to 4 feet in diameter by 150 feet in height. It is long lived, reaching as great an age as 500 years. Seed is produced in large quantities and seed years occur at rather short intervals. The germinative per cent is high and seeds sprout quickly, when brought in contact with a moist seed-bed. Western woodsmen are familiar with the habit which this species has of sprouting its seeds on the top of decaying logs. This explains the stilted appearance of many hemlocks, a condition resulting from the rotting away of the fallen trunk.

WESTERN RED CEDAR

Thuja plicata Don.

FIELD CHARACTERISTICS: Mature trees conspicuously swell-butted, and fluted. Form of trunk decidedly conical. In young trees, narrow, tapering conical crown extends nearly to ground. Limbs persist except in dense stands. Trees frequently with two leaders. Bark thin, grayish brown. Inner bark reddish brown and tough. Leaves small scale-like, opposite. Drooping sprays, usually flat. Cones about one-half inch long on short lateral branches, brown, about six scales covering two to three seeds. Seed with wing all around, very small. Wood light, soft and brittle. Heart wood reddish brown. Spicy odor.

This magnificent tree easily surpasses all others of that group commonly designated as cedars. Because of the great size attained by the mature trees, the species is sometimes designated as giant arbor vitæ, a name which contrasts it with the rather insignificant arbor-vitæ of the east. Throughout the region of its distribution, however, it is usually called western red cedar, or just plain cedar. The name "canoe cedar" has been used by some to indicate a use made of the tree by certain western tribes of Indians who took advantage

* Twenty miles west of Corvallis, Oregon, there stands a variation of the western hemlock, designated locally as a weeping hemlock (*Tsuga heterophylla flaccida*). It is singularly marked by irregular and inverted branches, giving the tree a decided "weeping" habit.

WESTERN RED CEDAR (*Thuja plicata*)

a. Fruiting branch showing scale-like overlapping leaves with resin pocket on outermost portion of each leaf, old persistent cone with reflexed scales and also newly matured cones. Each cone has its individual stem. Note the resemblance of cones to "Dutchman's Pipes."
(*x* indicates scale of reduction.)

of the unusual size of the trunks and of the ease with which the wood may be worked for the construction of their great war canoes.

The wood of western red cedar is light and soft. It is one of the lightest of the conifers, a cubic foot of the air-dried wood weighing about 24 pounds. It splits easily and is remarkable for its great durability. Because of its resistance to decay it is used extensively in the manufacture of shingles, cooperage stock, piling, posts, as well as telephone, telegraph, and transmission poles. The Japanese value red cedar very highly

for house construction purposes because it endures weathering well, and because of the constituents in the wood which render it resistant to the attacks of ants.

Western red cedar has a range from the coast region of southern Alaska southward through the coast ranges and islands of British Columbia, through western Washington and Oregon down to Mendocino county, California. In British Columbia it goes east to the western slope of the Continental divide. It appears in the Cœur d'Alene, Bitter Root and Salmon River mountains of Idaho and extends east to the western slope of the Rockies, in northern Montana. In Oregon it grows on both sides of the Cascade range. On the west side of the Cascades it goes south to Crater lake. Scattered specimens are found occasionally east of the Cascades in the Mt. Hood region.

Due to its moisture-loving nature, western red cedar makes its best development within the fog belt of the western coast of British Columbia, Washington and Oregon. This territory really marks the commercial range of the species. In this region trees have been found with a diameter of 18 feet and a height of 200 feet. These, of course, are unusual. Ordinarily the diameter will range from 3 to 8 feet. The total estimated stand of red cedar is about 154 billion feet. About 50 per cent of this amount is in British Columbia. The estimated stand of cedar in Oregon is 15 billion board feet. The normal amount cut into lumber annually in Oregon is 10 million board feet. Washington cuts about 10 times as much. About 78 per cent of all shingles manufactured in the United States are made of red cedar.

Mature specimens of red cedar have a decided tendency to become "swell-butted." The lower portion of the stem is apt to be roughly fluted and the entire bole has a pronounced conical form due to rapid taper. The growth is fairly rapid, seedlings averaging 18 inches in the third year. Because of the shreddy, inflammable nature of the bark, the trees are easily damaged by fire. The durable character of the wood, however, makes it possible to salvage these fire-killed trees many years later. Over-mature trees are subject to a dry rot, a condition designated as "pecky" by woodsmen. In common with western hemlock, western red cedar reproduces best on moist litter and duff. The seed is borne in large quantities even on small trees.

Red cedar is seldom found in pure stands. It mingles freely with other species, occurring singly or in groups, usually taking possession of situations which its more light-loving rivals can not endure.

PORT ORFORD CEDAR

Chamæcyparis lawsoniana (Murr.) Parlatore

FIELD CHARACTERISTICS: Boles straight, crowns narrow with drooping branches. Height 100 to 175 feet, rarely 200 feet. Diameters 3 to 6, and occasionally up to 8 feet. Bark 6 to 8 inches thick at base of mature trees. Broken into loose, narrow ridges, brown with reddish tinge underneath. Leaves scale-like on flat sprays, soft to the touch. Cones small, berry-like, maturing in first season. One to four reddish brown seeds in each cone scale.

Port Orford cedar is variously called ginger pine, white cedar, Oregon cedar, and Lawson cypress. The tree is limited in general range to a narrow strip of the Pacific coast approximately 225 miles long, and rarely more than 40 miles wide. The northernmost limit is in the vicinity of Coos bay. The Coos bay region, in fact, practically includes the entire commercial range of Port Orford cedar. The botanical range extends southward into California, where only a few trees are found here and there in scattered localities. The southern limit of the range is Mad river, Humboldt county, near Humboldt bay.

The tree occurs in dense stands in Oregon only; in fact, its commercial range is restricted to that region north of the Rogue river along the coast. The best development is attained about three miles from the shore and between the mouth of the Coquille river and Point Gregory, where it is the chief species in an almost unbroken belt about 20 miles long and 12 miles wide. Here the tree averages 3½ to 6 feet in diameter, and 125 to 180 feet in height, with the stem clear of limbs often for 150 feet. A maximum height of 200 feet, and a maximum diameter of 12 feet near the ground, have been recorded, but a tree of this size is extremely rare.

In quality Port Orford cedar ranks among the most valuable woods of the United States. No accurate estimate has been made of the remaining stand, but due to the limited range of the tree the total must necessarily be comparatively small. The 1920 production of Port Orford cedar was about 50 million board feet. During the war this wood was much in demand for airplane stock, because of its strength, its lightness, and because of the possibility of securing large, clear, straight-grained pieces. It is a remarkably durable wood, lumber having been cut from trees forty years after they had been fire-killed.

Because of its beautiful form and graceful foliage when grown in the open, Port Orford cedar has been widely used for ornamental planting. Probably it is more generally known because of this than because of the splendid lumber which it produces.

SUGAR PINE

Pinus lambertiana Dougl.

FIELD CHARACTERISTICS: Trunks of mature trees tall, straight, clear, cylindrical, slight taper. Tops of young trees symmetrical, branches regular. On mature trees tops flattened and branches irregular, usually two or more characteristically long branches. Bark brown to reddish, in young trees smooth and grayish in color. Bark on immature trees deeply fissured and divided into long, flat sections, from 1 to 3 inches thick. Cones few, pendulous, carried on tips of branches, slender, 12 to 24 inches in length. Seeds thin-shelled, about one-third inch long, winged, edible. Needles 5 in a whorl, 2 to 4 inches long.

Sugar pine is a tree of marked individuality. It ranges from the Santiam river in Oregon down to Lower California and from the Pacific in southern Oregon to the east slopes of the Cascades and Sierras. Its commercial range, however, is limited to the region extending from Douglas county in Oregon to Kern county in California. The larger portions of the commercial stands are found on the west slopes of the Cascades and Sierras.

The tree ranges occasionally as low as 2,000 feet and has been reported at an elevation of 11,000 feet. The merchantable stands, however, lie largely in situations between 3,000 and 9,000 feet.

In beauty of form the sugar pine is unsurpassed by any timber tree. The massive trunks of mature specimens are suggestive of huge columns. They extend upwards, clear of limbs, and symmetrical, for more than a hundred feet. To the lumberman there is little suggestion of waste about them. Their cones, gracefully hanging at the tops of wide-flung limbs, their rather sparce tops, the characteristic bark, deep-furrowed and broken into "turtle back" plates, present features which are not easily forgotten.

Sugar pine is rivaled in quality by only one American pine, the famous white pine of the east. In size it is unsurpassed by any pine. Commercially it is the most valuable timber pine on the Pacific coast. It is estimated that Oregon has 11 billion feet of sugar pine, and California 33 billion feet. The 1920 cut of sugar pine in Oregon was about 5 million feet. In the same year California cut 141 million feet.

SITKA SPRUCE

Picea sitchensis (Bong.) Trautvetter and Mayer

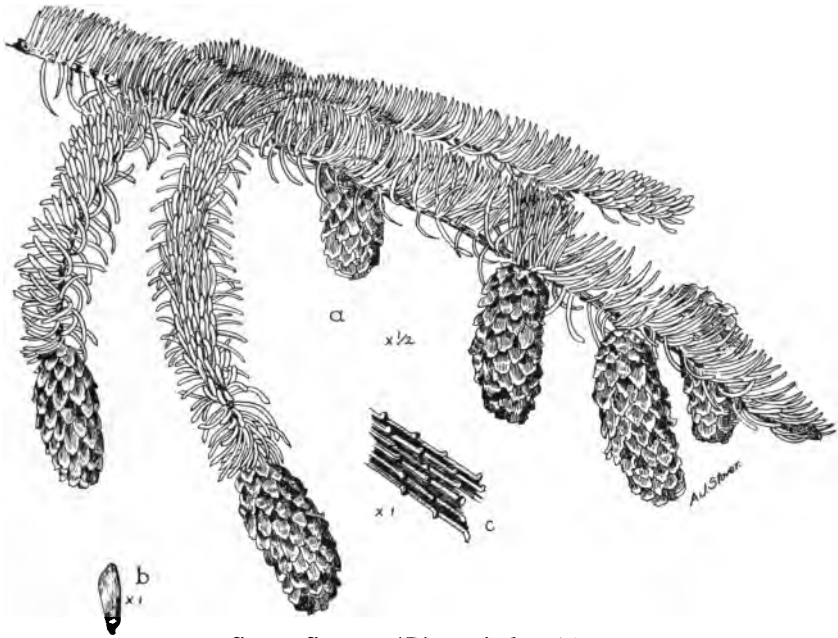
FIELD CHARACTERISTICS: In dense stands, long bole, moderate taper, open conical crown. Branches pendulous, small branches lacy. Leaves about 1 inch long, 4-angled, usually prickly pointed. Bark thin, small loose scales, dark reddish-brown. Cones abundant, pendulous, from 1 to 4 inches long, cylindrical, about 1½ inches in diameter.

Sitka spruce derived its common name from the Alaskan town which marks the vicinity of its northernmost range. The name "Tideland spruce," however, is perhaps more appropriate, in that it suggests the limited inland distribution of the tree, especially along the coast of Oregon and Washington, where it penetrates the interior only along estuaries and bays. In Alaska this spruce continues from the tideland flats and ascends the slopes of the mountains to an elevation of 3,500 feet. The tree is very exacting as to moisture requirements, both in the soil and in the atmosphere. Its restriction to a strip along the Pacific coast not exceeding 50 miles wide is evidence of this characteristic. It extends to the north as far as Cook inlet and Kodiak islands, Alaska, and southward to Caspar, Mendocino county, California. In the Columbia River valley it is found up to the foothills of the Cascades. South of the Columbia River valley the tree is distributed over a narrow area along the coast.

Moist, sandy soils in stream bottoms and along the coast are preferred. The tree will grow, although stunted, on thin soils such as found in the north, but here an abundance of moisture is supplied. Sitka spruce grows somewhat in pure stands in the north, but is more frequently found mixed to the south. Its common associates are western hemlock and, to a lesser extent, redwood, red cedar, maple, black cottonwood, and yellow cedar. This tree is relatively free from insect and fungus attacks. Although found in humid climates the trees are subject to great damage by fire if the forests do become dry, because of the thin bark and dense stands.

This species is tolerant of shade; in fact, reproduction will take place, and small trees will continue to grow when shaded from the side, but a certain amount of top light is required for full development. When fully grown the bole is heavily buttressed at the base, shows excessive taper and in fairly dense stands carries a pyramidal crown down two-thirds of the length of the tree. In open stands it holds its limbs to the ground.

Sitka spruce is remarkable for its rapid growth and large size. Seedlings will grow as much as 3 inches the first year in seed beds, and 9 inches the second year, and will continue throughout the juvenile stage at more than 12 inches per year until full height growth is attained. The average size of forest



SITKA SPRUCE (*Picea sitchensis*)

a. Fruiting branch showing pendent cones and leaves standing out from all portions of the stem.
b. Winged seed.
c. Detail featuring persistent woody leaf base.
(*x* indicates scale of reduction.)

grown trees is 3 to 4 feet in diameter by 100 feet in height, and a maximum of 15 feet in diameter by 250 feet in height. The tree ordinarily matures in 250 to 300 years, although specimens have reached the age of 500 years. Large quantities of seed is produced each year. Trees have been noted only 4 feet high and yet loaded with cones.

Prior to the war Sitka spruce was but little known outside of Oregon, Washington, British Columbia and Alaska. The demand for this splendid timber for airplane construction and the spectacular preparations made by the war department to get the material out advertised Sitka spruce throughout the entire country. The wood is admirably adapted for use in building airplanes. It is lighter than any other wood of equal strength which can be obtained in suitable sizes and amounts. The wood is decidedly tough yet is easy to work and is easily put in condition for final use. The total estimated stand of Sitka spruce in Oregon is 4,374,000,000 board feet. The Oregon cut for 1920 was 165 million board feet. The great reservoir of this timber is in Alaska. Forests of this territory have not yet been satisfactorily cruised.

WESTERN WHITE PINE

Pinus monticola Dougl.

FIELD CHARACTERISTICS: Tall, slender bole, narrow symmetrical crown, with short branches. Bark broken into small square blocks, on mature trees about 1 inch thick, in color varying from cinnamon in open stands to grayish purple in dense forest, smooth and thin on young trees. Leaves 2 to 4 inches long, 5 in bundle. Cones pendulous, at tips of branches 5 to 10 inches long, very slender, mature at end of second summer.

In quality western white pine is one of the most valuable timber trees in the United States and it is greatly to be regretted that more of this species is not found in Oregon. Estimates by the Forest Service place the total stand for the Pacific Northwest at 24 billion feet. Of this amount it is estimated that Oregon has only 100 million feet. The great stand of western white pine is in Idaho. It is estimated that this state has over 19 billion feet of this splendid timber.

The range of western white pine extends from British Columbia to the mountains of southern California and east to the Continental divide in Montana. In Oregon it is sparingly distributed throughout the Cascade mountains and in the higher portions of the Coast range. It is also found in the Blue and Warner mountains.

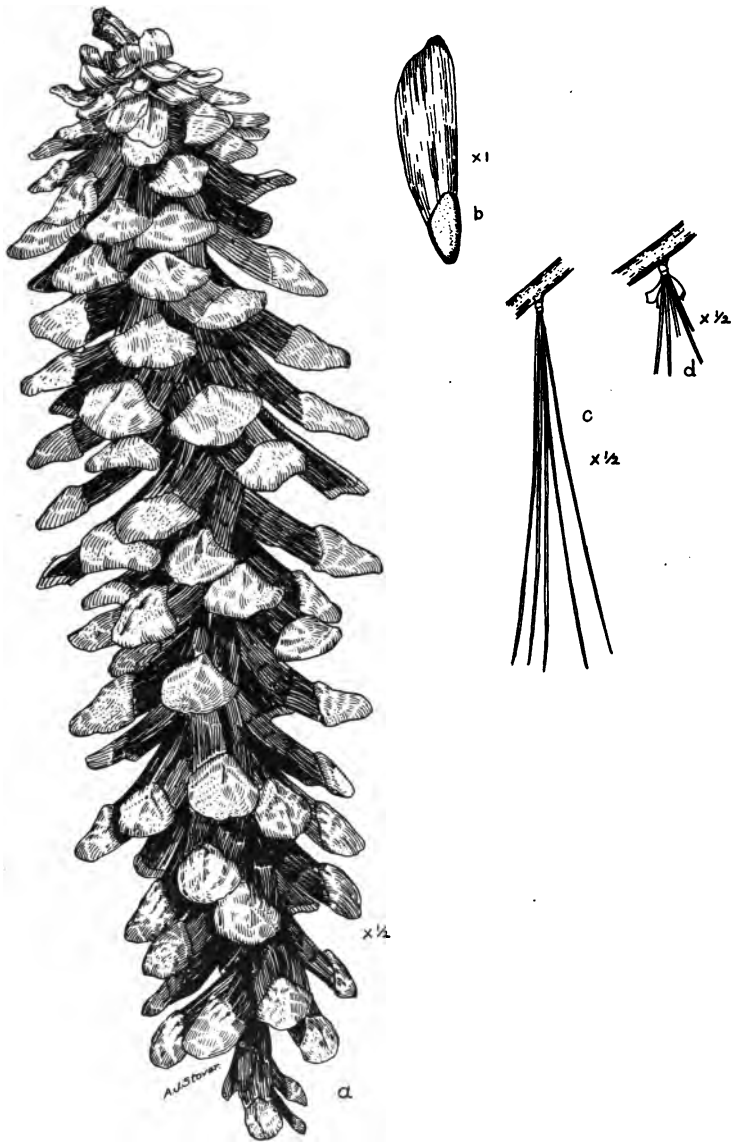
This tree never grows in pure stands, but is always associated with other species. It forms mixtures with lodgepole pine, Englemann spruce, western larch, grand fir, western red cedar and Douglas fir. Occasionally in the Cascades and Sierras it may make up 50 to 70 per cent of the stand on small areas. This is the exception. In Oregon the rule is that the tree furnishes the minor portion of the mixture, and, more often than otherwise, appears throughout the stand as scattered individuals.

LODGEPOLE PINE

Pinus contorta Loudon

FIELD CHARACTERISTICS: Beach form scrubby and distorted. Bark about one inch thick on lower stem, deep red-brown with rough furrows, cross checked. Inland form in dense stands, tall, slender bole, with rounded crown. Bark thin, smooth, pale brown with grayish tinge. For both forms, needles 2 in sheath, 1½ to 3 inches long. Dense on branches. Cones 1 to 2 inches long, numerous and persistent.

Two distinct forms of this pine exist. The one restricted to the region of the Pacific coast is known as *Pinus contorta* and is commonly called beach pine, sand pine, scrub pine, and tamarac pine. This is scrubby and distorted in outline, and, because of its diminutive size, is of little value. The other, the mountain or upland form, is larger and, in certain regions, has considerable commercial value. It extends inland to the slopes



WESTERN WHITE PINE (*Pinus monticola*)

a. Mature woody cone with stem, showing reflexed scale with thickened tips.
b. Winged seed, natural size.
c. Detail showing leaves in bundle of five.
d. Diagrammatic sketch of deciduous sheath at base of leaf bundle.
(*x* indicates scale of reduction.)

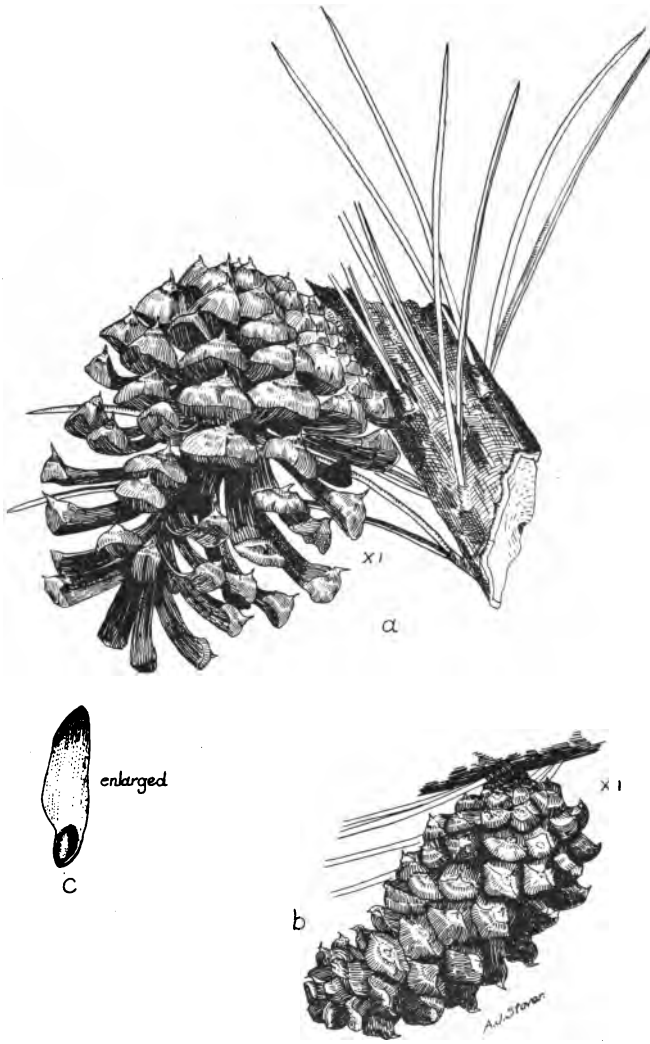
of the Continental divide and is identified as *Pinus contorta,* var *murrayana,* and by some as *Pinus murrayana.* This form is commonly called lodgepole pine, but tamarac, spruce pine, and Murray pine are names frequently applied to it. In the mining region of the Rocky mountains it is extensively used for mine timbers. It is also employed for ties, posts and poles under conditions where short service only is required. However, when creosote treated, the timber will last 20 years or more in contact with the soil.

Including both forms, this tree has greater latitudinal range than any other pine. It is found from the Yukon river south to the mountains of Lower California. Its east and west distribution is from the Pacific coast as far as the Black hills of South Dakota. Throughout this wide range the tree endures many diversities of climate and occurs from sea level to an elevation as great as 11,500 feet. In Oregon the tree seldom reaches an elevation of more than 6,000 feet.

North and east slopes are preferred by this tree, while south slopes appear to be least favorable to its development. It makes its best growth upon high plateaus and benches in the vicinity of streams and meadows. Limestone soils are avoided, the preference being for moist sandy sites with gentle slopes, although the tree is adapted to dry gravelly soils. Throughout the Rocky mountains, from the far north down to the southern part of Colorado, this tree forms extensive forests of pure stands. It occurs more in mixture with other species in the Cascades, Sierras, and Coast mountains. In the Pauline mountains of Oregon lodgepole forms 50 per cent of the forest. In the Deschutes National forest it forms 19 per cent of the forest, while in the Minam it makes up one-third of the stand. The commercial stand of lodgepole in Oregon is not much over 5 billion board feet.

Lodgepole pine forests are particularly susceptible to fire damage because of the thin bark of the tree and the very dense stands. The small cones which remain closed long after the two-year period of ripening, are forced somewhat by the intense heat of these fires, and are subsequently easily opened by the heat of the sun, with the result that the fire-swept forest floor with its exposed mineral soil is well sprinkled with seed. It follows that a new forest quickly springs up and replaces the old. The trees produce seed as early as ten years, but the largest production is from 20 to 40 years. Where lodgepole pine grows in pure stands the forest is decidedly dense. In places the younger stands are so thick as to be almost impenetrable.

In the struggle for survival, these trees produce long, slender poles which are admirably adapted to the common use of corral poles, telegraph poles, telephone poles, house logs,



LODGEPOLE PINE (*Pinus contorta*)

a. Twig showing woody cone with reflexed scales, and also showing leaves, two in a bundle with persistent sheath at base of each bundle.
b. Unopened cone.
c. Winged seed, natural size.
(*x* indicates scale of reduction.)

railway ties, and fuel. The Indians commonly used the small stems as supports for their lodges, hence the name "Lodgepole."

In Oregon this pine grows slowly. It makes an average diameter of 12 to 18 inches and a height of about 90 feet. In the high Sierras, trees are occasionally found 6 feet in diameter and 150 feet high.

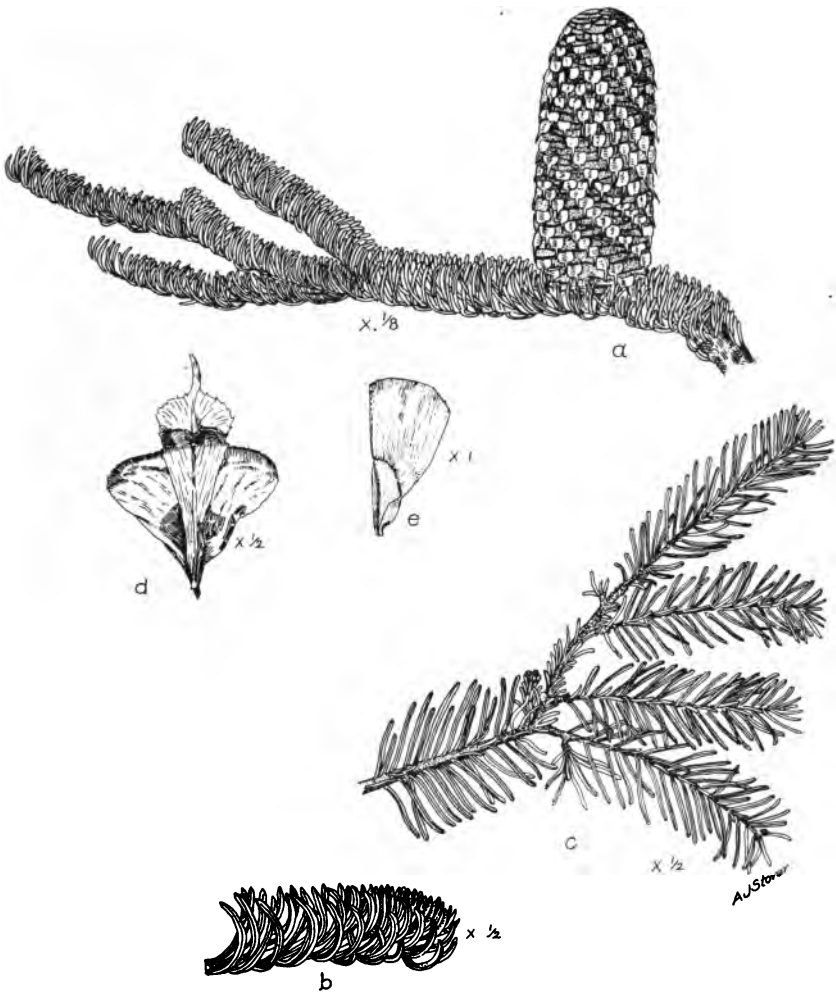
NOBLE FIR

Abies nobilis Lindley

FIELD CHARACTERISTICS: Leaves pale to deep bluish-green, usually with silvery tinge. Leaves on exposed branches curved to upper side, giving decidedly compact appearance; four angled, pointed, and about three-fourths inch long. On sheltered branches leaves flat and usually notched at end, and are 1 to 1½ inches long. Cones 4 to 6 inches long, and 2 to 3 inches in diameter, standing erect on branches, and usually massed near top of tree. Bark 1 to 2 inches thick, divided into flat, narrow ridges. Surface bark ashy-brown, freshly exposed bark, reddish-brown. Mature trees, height up to 250 feet, diameters up to 7 feet. In dense forest straight, clear bole for 100 feet and more.

Noble fir is the most valuable commercial species of the so-called "Balsams" or true firs. Like all the white firs, it is variously called fir, white fir, balsam, balsam fir, true fir and silver fir. A common misnomer in the lumber industry is the application of the name "larch" to this species. No doubt lumbermen have originated this name in the past to rid this valuable fir of the prejudice which has always existed against the name "white fir." At any rate the name has persisted and continues to cause much confusion among woodsmen and students. "Larch mountain" in the forest environs of the city of Portland is, no doubt, named in honor of the noble fir which grows in such splendor upon its slopes, rather than of the true larch, which is less frequently represented. Noble fir, however, is in no wise related to the larch family. The noble fir is persistently evergreen, while the larch is distinctly deciduous, shedding all of its leaves each winter.

Noble fir is restricted to the Pacific Northwest. It is found only in the Coast range and Cascades of Washington and Oregon, extending to the north as far as Mt. Baker. It has not been authentically found in the Olympic mountains of Washington, and is only sparsely represented in the Coast mountains of Oregon, being noted at an elevation of 4,000 feet on Mary's peak, and southward nearly to the Siskiyous. It is found on the east side of the Cascades southward only as far as latitude north 45°. It has been reported on the west side of Mt. Hood at a point three miles below Government camp and upward; on the north side, at 4,500 feet; on the Clackamas watershed; Crater lake on Wizard island, and from 4,600 feet on the rim of the lake to the top; Browder ridge in the Santiam forest; and on the north side of the Siskiyous in the Ashland National forest. The tree's altitude limits are between 1,400 and 6,000 feet, attaining the latter elevation chiefly in its southernmost range.



NOBLE FIR (*Abies nobilis*)

a. Fruiting branch showing erect mature cone with extended bracts.
b. Detail featuring arrangement of leaves particularly uppermost twigs; also found on small specimens.
c. Arrangement of leaves occasionally found on lower branches of crown and also observed in small juvenile specimens.
d. Lower side of cone scale showing irregularly notched bract with long tapering point.
e. Winged seed, natural size.
(*x* indicates scale of reduction.)

WESTERN LARCH

Larix occidentalis Nuttall

FIELD CHARACTERISTICS: Trunk straight and clear, 50 to 100 feet. Crown short, narrow, open, running to a point. Bark on mature trees reddish-brown, 3 to 6 inches thick near base, deeply furrowed, thinner and smooth above. Foliage pale green, changing to bright yellow in the fall. Leaves in clusters from 14 to 30, 1 to 1½ inches long, deciduous. Cones 1 to 1½ inches long, cone scales covered with soft, whitish hairs. Heart wood reddish-brown, sapwood whitish.

The commercial range of western larch is in southwestern British Columbia, western Montana, northern Idaho, northeastern Oregon and eastern Washington. The principal stands are in Montana and the lumber goes into the market under the name of Montana larch. The estimated stand of western larch is 28 billion feet, of which Oregon carries about 3½ billion feet. The production of larch in Oregon in 1920 was about 18 million feet. Montana produces easily ten times this amount.

Due to the fact that it sheds its leaves in the fall larch can not be mistaken for any other cone-bearing tree.

Western larch is used for general building and structural purposes. In distinction from eastern larch it is durable when used under exposed conditions. Lumbermen frequently give the name of larch to noble fir. For the sake of avoiding confusion in the names of our timber trees, this practice should be discontinued.

GRAND FIR

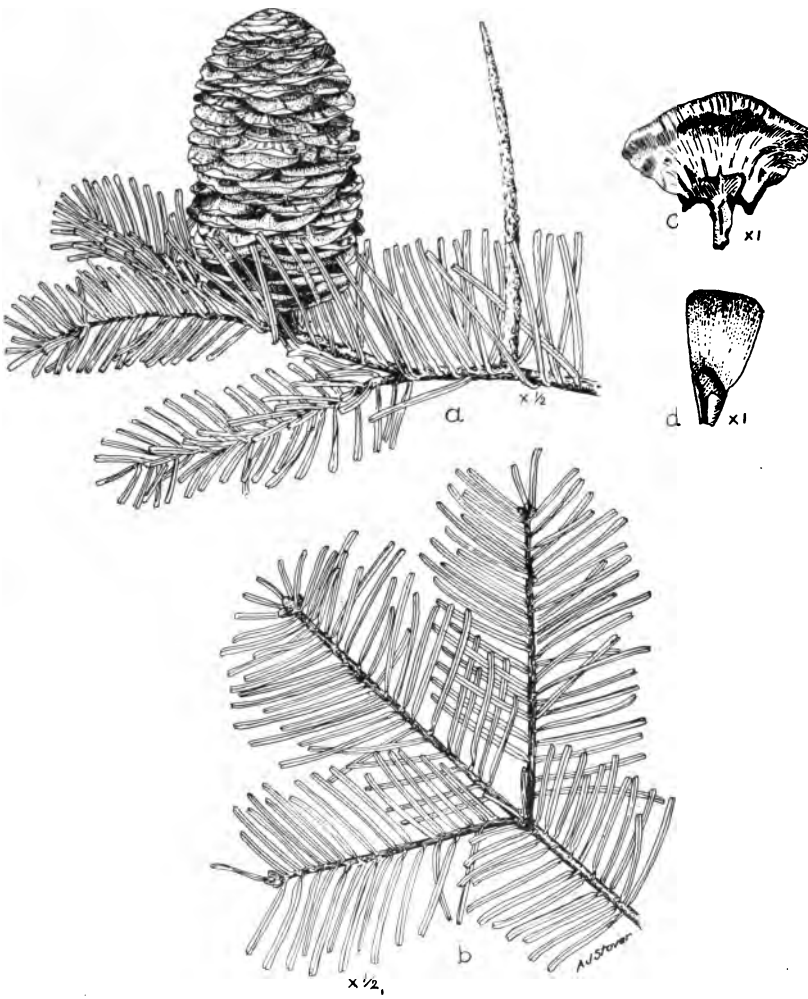
Abies grandis Lindley

FIELD CHARACTERISTICS: Straight trunk. Mature trees, on favorable sites, 150 to 250 feet tall. Diameter 3 to 4 feet. Smooth or slightly broken light brown bark, about 1½ inches thick, hard. Tops narrow and pointed to rounded, extending nearly to ground in open stands, in forest covering about one-half of the stem. Needles of lower branches two-ranked and flat, 1 to 2½ inches long, upper branches dense and shorter. Cones 2 to 4 inches long, 1½ to 2 inches in diameter, oblong, erect, and carried largely in topmost branches.

Grand fir is distributed from southwest British Columbia to northern Sonoma county in California, and east to northern Idaho. It is decidedly a lowland tree, making its best growth in the moist valleys and lower slopes of the region of its distribution. In Oregon it appears in the Blue and Powder River mountains, but chiefly in the valleys and lower slopes of the Cascade and Coast Range mountains.

While the tree ranks in size with the valuable timber trees, the wood of grand fir is of little use for lumber. The wood is very knotty and decays quickly when exposed to moisture. It

is used to a limited extent for pulp-wood. It appears in mixture with other timber trees of its region. No estimate of the total amount of this species has been made. Ordinarily the tree may be identified by the disagreeable odor of the wood, a characteristic which has led some woodsmen to dub the tree "stinking fir."



GRAND FIR (*Abies grandis*)

a. Twig from top of tree showing erect cone and persistent axis of cone of previous year.

b. Twig showing flat spray of leaves characteristic of lower branches. Note notched leaves and blunt, resin-coated winter buds.

c. Lower side of cone scale featuring bract distinctly notched, shoulders slightly rounded and with short tip.

d. Detached winged seed.

(*x* indicates scale of reduction.)

WESTERN JUNIPER

Juniperus occidentalis Hooker

FIELD CHARACTERISTICS: Open crown, rounded, with branches carried nearly to the ground, from 15 to 20 feet high, rarely 50 to 60 feet. Short, rapidly tapering trunk. Diameter 15 to 30 inches, rarely reaching 5 feet. Bark cinnamon-brown, one-half to 1½ inches thick, divided into flat ridges by wide furrows; stringy. Leaves scale-like, fruit berry-like, about one-third inch long, maturing the fall of the second year. Two to 3 seeds in each berry.

The western juniper is distributed from the Canadian line to Lower California and eastward to the northern Rocky mountains. In Oregon the range is principally throughout the arid portions of the eastern part of the State. It ascends the east slope of the Cascades up to about 6,000 feet. The wood is very enduring in contact with the soil. Because of this, juniper is highly prized for post material. Tests have been made of this wood for pencil manufacture, and it has been found to be well suited to this use. A factory at Bend is engaged in making pencil slats from the juniper in the vicinity of that city. Due to the scattered nature of the stand, no estimate has been made of the amount of this species in the State.

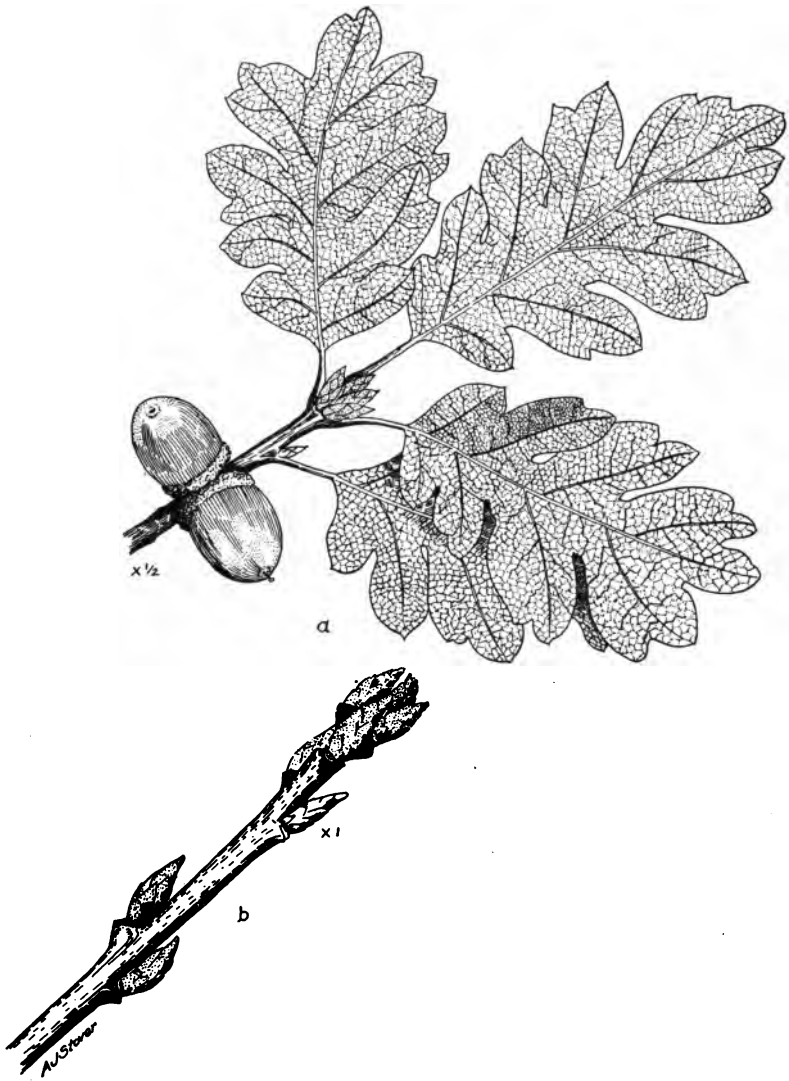
PACIFIC POST OAK

Quercus garryana Hooker

FIELD CHARACTERISTICS: When mature 30 to 60 feet high. Trunk short. Crown usually rounded and broad. Branches heavy and widespread. Bark ashy gray, finely divided into checks. Leaves 4 to 6 inches long, 2 to 4 inches broad, dark green, yellowish veins underneath, 5 to 7 lobed. Acorns mature first year, one-half to 1¼ inches long, up to 1 inch thick.

The Pacific post oak is the largest and most common oak of Oregon; in fact, it is the only native oak found outside the southwestern part of the State. Its range is from the Santa Cruz mountains of California north to Vancouver island. It is limited to the valleys and lower mountain slopes west of the Sierra Nevada and Cascade mountains. In elevation it grows from sea level up to 3,500 feet. It is common to find rather dense groves of comparatively young stuff, with here and there the decaying remains of old veterans, the originators of the stand. Since the coming of the white man, fires have been largely kept out of the lower country. As a result, the tall, fast growing Douglas fir is found to be gradually encroaching upon the oak stands, and is smothering them out. This condition is easily demonstrated when one goes through certain of the second-growth foothill forests, where he finds the remains of old oaks under conifers which have a diameter growth up to 3 feet, and a height of 150 feet.

The post oak has a high fuel value. The second-growth makes excellent handle stock and is useful about the farm for purposes where strength is required. Sawn lumber from this tree is used to a limited extent for interior finish, floors and



PACIFIC POST OAK (*Quercus garryana*)

a. Fruiting branch. Note saucer-shaped base to acorn, the pointed buds and the entire margins on lobes of leaves.

b. Twig detail illustrating pointed winter buds.

(*x* indicates scale of reduction.)

furniture. If properly seasoned and handled it is practically as valuable for these purposes as the eastern oaks. Since the tree occurs in such sparse stands, no satisfactory estimate can be made of the total amount of material in the State.

The timber of this oak is very durable in contact with the soil. When properly seasoned, so that an otherwise high moisture content can not encourage the growth of wood destroying fungi, posts made from this wood will last through long periods of time. There is on record a case in southern Oregon where oak fence posts have been in the ground fifty-six years, and, judging from the general appearances, they can endure for another half century.

The oak reproduces itself by sprouts and by seedlings. The best stands are invariably of seedling origin. Acorns are pro-

BROAD LEAF MAPLE (*Acer macrophyllum*)
a. Fruiting branch. Note the hair-like appendages covering the seed coat cluster, also note the characteristic large leaf.
b. Diagrammatic sketch of terminal winter bud, enlarged.
(*x* indicates scale of reduction.)

duced each year and in this respect the tree is easily distinguished from the black or red oaks which mature their fruits in two years.

BROAD LEAF MAPLE

Acer macrophyllum Pursh.

FIELD CHARACTERISTICS: Open grown trees, short bole, broad, dense, rounded top, profusely branched. Forest grown trees 20 to 90 feet in height, short, narrow, irregular crown. Bole rarely 3½ feet in diameter, usually 1 to 2 feet. Bark ash-gray to brownish-gray in color, on old trees broken into rough, fairly broad ridges. Leaves 6 to 12 inches, rarely 15 inches wide, divided into 5 broad lobes. Prolific seed producer, fruit maturing in late fall; seed covered with short, stiff hairs. Seed wings 1 to 2 inches long.

Broadleaf maple is universally known as Oregon maple in this State. Its general range is from southern Alaska to southern California and principally west of the Cascade and Sierra Nevada mountains. In Oregon it is quite generally distributed west of the Cascades, making its best growth in the rich soil of the lower valleys. It is found most frequently in mixture with Oregon ash, red alder, lowland fir, and Douglas fir. Occasionally pure stands of maple are found in the moist soils of the valley bottom lands.

The forest grown trees produce a fairly good grade of lumber. The wood is hard, dense, and strong, and is used locally for practically all the purposes for which the eastern maple is employed. It excels all the other local hardwoods for use in the manufacture of furniture. The "bird's-eye" form is occasionally found and is especially valued in the production of novelties. The tree is comparatively long-lived, occasionally reaching 150 to 200 years. Trees grown in the open appear to be especially liable to attacks by fungi. For this reason Oregon maple is poorly suited to street planting.

OREGON ASH

Fraxinus oregona Nuttall

FIELD CHARACTERISTICS: Forest trees 50 to 80 feet high, 15 to 30 inches in diameter. Bark deeply checked, soft on surface, ashy-brown. Branches distinctly opposite. Large chocolate-brown terminal buds. Leaves 6 to 12 inches long, with 5 to 7 leaflets. Seed ripens in early fall, growing in large clusters.

The Oregon ash is so named because it occurs most generally in this State. It ranges northward to the shores of Puget sound, but never east of the Cascade mountains, nor in the Olympic mountains. To the south the range extends into California as far as San Francisco bay in the coast region, and to the mountains of San Bernardino and San Diego counties

along the Sierra Nevada mountains. In Oregon it is limited to the western portion of the State.

In some of the mountainous regions of its range this tree is found as high as 2,500 to 3,000 feet in elevation, but ordinarily it occurs in valleys and along river bottoms. Some of the best stands are in the Willamette River valley, although the largest growth is attained in the rich, deep, humus soils in southwestern Oregon.

OREGON ASH (*Fraxinus oregona*)

a. Fruiting branch showing beside fruit the typical compound leaf.
b. Detail illustrating small lateral buds and the much larger terminal bud.
c. Twig detail illustrating opposite branching and abortive twig.
(*x* indicates scale of reduction.)

The common associates of Oregon ash are red alder, broadleaf maple, and California laurel. The tree is also found with grand fir and Pacific post oak in the north, and with white alder and California sycamore in the south. It is occasionally found in pure stands, but in such cases is limited to very small patches. This tree can endure only partial shade as small seedlings, and in later life can not thrive without top light.

The wood of the forest-grown trees is moderately fine grained, and has a tendency to be brittle, but the wood of thrifty young open-grown trees is coarser grained and elastic, particularly the sapwood. Except for a dull, yellowish-brown color and more open texture in the spring wood, the wood is quite similar to the eastern ashes and can be used for much the same commercial purposes.

RED ALDER

Alnus oregona Nuttall

FIELD CHARACTERISTICS: Forest grown trees, comparatively straight trunk with rather slender side branches. Open grown trees profusely branched. Top rounded. Height 50 to 100 feet, but normally 40 to 50 feet. Diameter 10 to 20 inches. Bark smooth, thin, gray to whitish in color. Buds deep red. Leaves 3 to 6 inches long, larger on young thrifty shoots, edges notched. Produces seed abundantly. Seed carried in little cones, one-half to 1 inch long. Seeds bordered by wing-like growth.

Red alder ranges from southern Alaska along the coast to south central California. It makes its best growth in moist bottoms and along streams. Its moisture-loving tendency is shown by the dense growth which it makes along the streams of western Washington and Oregon. It makes volume growth with exceptional rapidity.

Red alder, though a secondary forest tree, is coming to command the attention of woodworkers because the timber has a cherry-like, fine grain, and, while light in weight, is comparatively strong. Recently alder wood has come on the market in small quantities for furniture manufacture. With the lessening of the hardwood supply in the east this particular species should have a larger market in the future. Owing to the scattered nature of the stand, an estimate of the stumpage has not been attempted.

MINOR SPECIES

The following trees are of commercial size, but due to the limited amounts are of small commercial value:

YELLOW CYPRESS (*Chamæcyparis nootkatensis*). Chiefly in Alaska, British Columbia and Washington. In Oregon as scattered individuals or groups on the west slope of the Cascades, as far south as the Santiam river.

INCENSE CEDAR (*Libocedrus decurrens*). Chiefly in California, scattered on both sides of the Cascades north nearly to Mt. Hood. Not numerous enough to be of much importance commercially. A rough estimate places the stand in Oregon at 1 billion feet.

REDWOOD (*Sequoia sempervirens*). There are a few scattered stands of this species along the coast of southwestern Oregon.

MOUNTAIN HEMLOCK (*Tsuga mertensiana*). This is an Alpine species which ranges southward from Alaska, principally in the Cascades and Sierras, to the southern portions of the latter range, and eastward to northern Idaho and Montana. In Oregon it appears on both slopes of the Cascades, chiefly between 5,000 and 7,000 feet.

ALPINE FIR (*Abies lasiocarpa*). In Oregon on both sides of the Cascades and in the Blue mountains, growing at elevations of 5,000 to 8,000 feet.

WHITE FIR (*Abies concolor*). This tree ranges through the mountains of southern Oregon and of California, extending into northern Mexico, going eastward into the Rocky mountains of southern Colorado. In Oregon it grows southward from the headwaters of the Willamette river, at elevations of 2,000 to 8,000 feet. In California it is of value as a lumber producing tree, but in Oregon, due to sparseness of the stand, it can not be regarded as of much commercial importance.

AMABILIS FIR (*Abies amabilis*). Ranges from southern Alaska to Crater lake in Oregon. In Oregon it occurs chiefly on the west slope of the Cascades from 2,000 to 5,000 feet. It grows in mixtures with other trees and has but little commercial value.

BLACK COTTONWOOD (*Populus trichocarpa*). Quite generally distributed throughout Oregon, particularly on moist bottom lands. Sometimes called "balsam cottonwood." Trees occasionally make a diameter of six feet. Used to limited extent for pulpwood and for box lumber.

MADRONA (*Arbutus menziesii*). In Oregon this tree grows chiefly along the foothills and streams of the southwestern part of the State. The tree is easily identified by the smooth reddish-brown bark, which peels off in thin flakes, and by the thick, leathery leaves. The wood is being used to a limited extent for furniture and novelties.

FRUITING BRANCH OF MOUNTAIN HEMLOCK (*Tsaga mertensiana*)
Showing larger cones and denser leaf clusters than those which characterize *Tsuga heterophylla*

THE FARMERS' WOODLOT

Much of that portion of Oregon which lies within the limits of the original forested area is but little advanced beyond the pioneer stage. The majority of the ranchers of this region view the forest cover largely as did the pioneers of the east and of the Lake States and the Mississippi valley. In the main the trees, to them, are an encumbrance, an obstacle in the way of their farming operations. This attitude is especially emphasized by the fact that the clearing of the land for agriculture means to them a capital investment all the way from $50.00 to $150.00 per acre. The ranchers of the timbered region of Oregon, however, will do well to take a leaf from the book of experience of their brethren of the east to the end that they may profit thereby. Eastern farmers held the forest as lightly as do the farmers of the west, and as a consequence are now feeling the pinch of high fuel and lumber prices. Men now hardly past middle age believed, when young, that they would never live to see the vast forests of the Lake States and of the South removed. But the forests of the Lake States are practically gone, and the forests are rapidly vanishing in the South. The farmer of the Lake States and of the upper Mississippi valley is now paying a freight charge of $15.00, or more, on each thousand feet of lumber he uses, in addition to a high price justified by the scarcity of the material. For fuel, the farmers of the Lake States have come to depend largely upon coal, and, consequently, suffer from cold in times of coal miner strikes and railroad tie-ups. Without intelligent action the history of the east will be repeated in the west.

Land clearing in the timbered area of Oregon has not progressed so far that the great majority of ranchers may not retain small areas of timbered land on their holdings, or may not acquire such areas in the shape of lands carrying second-growth material, at present regarded as of low commercial value. Such a woodlot would insure perpetual independence in the matter of a fuel supply and would, depending on the size of the tracts, furnish much of the fencing material and farm timbers constantly in demand on every ranch.

Species Suited to Wood Lots.

Due to its rapid growth rate, the comparative ease with which it can be reproduced, its high fuel value, and the general utility of its wood for construction purposes, Douglas fir may safely be regarded as the most satisfactory woodlot tree for the greater part of the region west of the Cascades. The following table, taken from data collected by the Federal Forest Service, indicates the growth rate, by decades, of Douglas fir on aver-

Farmer's Woodlot

This second growth Douglas fir is making wood at the rate of one cord per acre per year

age good soil in the foothill region west of the Cascade mountains. In securing the information contained in this table, measurements were taken on 361 sample plots having a total area of approximately 250 acres.

Age	No. trees per acre	Diameter of average tree	Height of average tree	Yield per acre 10 years	Average annual growth,	Yield per acre
Years		*Inches*	*Feet*	*Cu. Ft.*	*Cu. Ft.*	*Ft. B. M.*
10	.....	.....	.....	1,000	.....	.....
20	990	4.6	32.0	2,150	115	.....
30	580	6.9	46.0	3,550	140	.....
40	410	8.9	59.0	5,400	185	12,400
50	340	10.4	69.5	7,550	215	28,000
60	265	12.3	82.0	9,650	210	41,000
70	208	14.4	95.0	11,500	185	51,700
80	167	16.5	107.5	13,100	160	61,100
90	137	18.7	120.5	14,400	130	70,300
100	115	20.9	134.5	15,600	120	79,800
110	100	23.0	147.0	16,750	115	90,300
120	92	24.5	156.5	17,800	105	101,500
130	90	25.2	161.0	18,850	105	113,000
140	88	25.9	166.0	19,900	105	122,600

Forest Service Circular 175, p. 18, "The Growth and Management of Douglas Fir in the Pacific Northwest," by T. T. Munger.

From the above table it will be seen that the most profitable results, measured in terms of cubic feet per year, may be obtained by bringing the trees to an age of fifty years to sixty years. At fifty years the figures show an annual growth per acre of 215 cubic feet. The stacked cord of split fir, 4 feet high, 4 feet wide, and 8 feet long, contains approximately 90 cubic feet of solid material. It is evident, therefore, that there will be an average annual production of about two and two-thirds cords of wood per acre, if the trees are held until fifty years of age. A twenty-acre tract properly managed, would thus supply about forty-eight cords of wood per year, twice the amount of fuel wood required to supply the needs of the average rancher. The surplus would furnish fence post supplies and the occasional requirement for dimension stuff and lumber.

There are hundreds of ranches in western Oregon which have small tracts of second-growth fir of varying ages. These tracts may easily be converted into permanent woodlots by the exercise of a little systematic care. Fire should be rigidly excluded from the woodlot areas and stock should not be permitted in them in sufficient numbers to pack the soil or to wear out the protecting ground cover of twigs and leaves. Undergrowth should be maintained on the edges of the tract to reduce, as far as possible, the effects of drying winds.

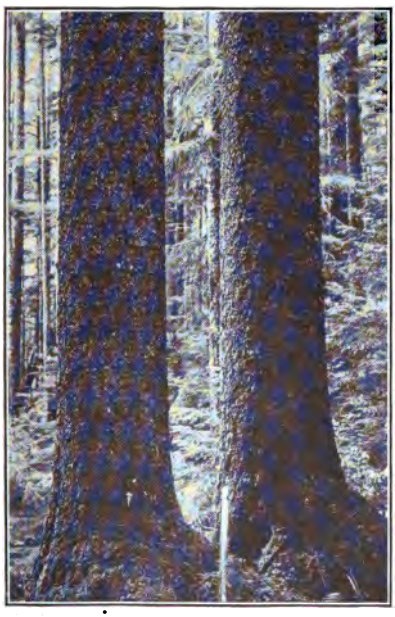
With Douglas fir the ideal arrangement would be to have a tract of about 20 acres and to cut about two-fifths of an acre of the oldest stuff each year. This arrangement would make an annual yield of about twenty-four cords. It is very evident, of course, that it would take fifty years to bring about this ideal arrangement if one were to start with the bare soil and were to plant the entire tract at once. It is noted above, however, that there are many tracts of second-growth stuff scattered through the agricultural area of western Oregon. The woodlot tract could be selected in this second-growth and cuttings could begin with the stands which have attained the greatest age. As is well known, the greater fuel value comes from the more mature woods. Since but a small number of the trees which start on an acre of ground reach an age of fifty years, due to nature's method of killing off the weaklings in order that the fittest may survive, a large amount of fuel wood may be obtained by thinning the stand whenever it appears to be too dense. These thinnings should remove the weaker trees, thus giving the stronger ones a chance to make diameter growth more rapidly.

Douglas fir is one of the best of our timber trees to reproduce itself. The seed is most likely to grow if brought into direct contact with the mineral soil and the little trees thrive best in full sunlight. Clear cutting has been found advisable in case a second crop is desired. The slash should be burned early in the spring time while the humus is still wet. This condition is necessary in order that the seed which has been stored up in the soil by squirrels, mice, and chipmunks may not be destroped by the heat. This stored-up seed germinates very quickly when the full light and warmth of the sun reaches it. To supplement this supply, seed will be blown in from the surrounding trees since each little seed is equipped with a wing which enables it to go a long distance when backed by an ordinary breeze. In managing small woodlots of Douglas fir good reproduction can be assured by cutting narrow strips, thus giving the seed from the standing trees a chance to cover the cut-over area. The dense second-growth stands of the Willamette valley, which have followed fire and logging, furnish ample evidence to the observer of the wonderful power of this tree to establish the foundation of a new forest.

On many ranches there are small tracts along streams where the banks are too steep for cultivation, or where it is inadvisable to remove the tree growth because of the washing away of the soil which is sure to follow clearing. In such situations the broad-leaf trees, like maple, alder, ash, or cottonwood, which are native to the locality, may be encouraged to grow. These species do not grow as tall as Douglas fir and

other conifers, and consequently will not throw as much shade outside their own particular site, a fact which should be taken into account where adjacent land is cultivated.

In the whole fuel wood proposition, it is well to understand that fuel values are approximately proportional to dry weights. Cottonwood will grow faster in volume than Douglas fir, but a cubic foot of Douglas fir, thoroughly dried, weighs more than a cubic foot of cottonwood, and hence has a greater fuel value. To be exact, 5.6 cords of Douglas fir will supply the same amount of heat as 7.8 cords of cottonwood. It is also a good thing to remember that, while the commercial value of these second-growth tracts is small, the story of the Lake States and the east generally will be very largely repeated here in the northwest, and that this material, growing in the main on lands of low agricultural value, will, because of the growing scarcity of timber, have a much greater future value. If the majority of the ranchers in western Oregon would insure their future independence in the matter of fuel supply by maintaining woodlots on their holdings, they would not only benefit themselves greatly, but would also be making a very considerable contribution to the future timber supply of the nation.



SITKA SPRUCE

WHITE FIR, *abies concolor* (left)
NOBLE FIR, *abies nobilis* (right)

A Forest Policy for Oregon

Forest Land Ownership.

When the rapid depletion of the eastern forests forced the problem of forestry upon the attention of Congress, that body passed a law, in 1891, empowering the President of the United States to set aside, for watershed and forestry purposes, such unappropriated forest lands as in his judgment appeared to be needed in the interest of public welfare. Acting under this law, the various Presidents have set aside a net area of approximately 156,000,000 acres of forest land. This area is permanently dedicated to the production of timber crops in the interest of all the people. It is a part of the policy of the Federal Forest Service, in handling this timber, to offer it for sale when it is mature. Out of the total area of public timber land set aside for forestry purposes, Oregon has within the borders of the State, under the control of the Forest Service, approximately 13,000,000 acres. All of this great wealth of standing timber will be manufactured into lumber within the State.

Of all the land which, under the various land laws enacted by the Congress of the United States, passed into private ownership, over 368,000,000 acres are still in forest. Some of this land, when cleared, will be devoted to agriculture. Most of it is suited only to forest growth. As far as the State of Oregon is concerned, it has over 493,000 million feet of timber which is ready for the saw when market conditions demand it, and easily 2,000,000 acres of land which is not now producing anything and which can grow timber crops to greater advantage than anything else. This property, the Forest Service land, the privately-owned timber land, and the non-producing forest land, the stumpage it carries and the stumpage it can produce, represents the material with which Oregon is directly and indirectly concerned in formulating a forestry policy.

The Problem Both National and State.

In discussing a forestry policy for Oregon or for any other State, it should be understood that the problem is intimately connected with that of the whole nation. The products from Oregon's forests are marketed in Chicago, New York, and in Boston. The material goes there because it is needed there, just as Pennsylvania steel comes to Oregon because it is needed here. Ordinarily the need for any commodity is expressed in the price people are willing to pay for it. Forest economists are convinced that there will be a need for all the timber which can be produced in all the potential forest lands in the United States, and that this need will be great enough to cause people to pay a price for the timber high enough to justify the growing of the crop. Oregon's forest problem is therefore dove-

tailed in with the national forest problem and must be thought of in connection with it. Just as the State's obligation must extend to every county within its limits, so must government interest embrace every State in the Union. Oregon's first interest is in seeing that its own citizens are assured a plentiful supply of building material at reasonable prices for all time; that industries dependent upon timber can be established in the State with assurance of permanence; and that absolute forest land is kept in crop so that it may contribute to the building of roads, the maintenance of State institutions, and to the support of all other proper State and local activities. Secondly, as one in a union of states, being itself located in a region favored by nature for timber growth, Oregon has an obligation to help grow the Nation's timber supply.

The Federal Government, on the other hand, is interested first in seeing that Oregon grows timber on every acre best suited to such use, in order that there may be produced in excess of the needs of residents of the State supplies for distribution to those states having little or no timber. Therefore, it behooves the Government to encourage and assist all states in forest replacement. Obviously, this encouragement and assistence should go in the greatest degree to those states which can contribute most to the Nation's lumber yard. Oregon, having 20 per cent of the standing timber in the United States, should receive Federal aid approximately at that proportion.

Federal Activities.

National legislation ordinarily results when sufficient pressure is brought to bear on Congress to convince that body of the desirability for action. Congress has created the Federal Forest Service and charged it with the responsibility of administering more than 156,000,000 acres of forest land. The Forest Service is dependent directly upon Congress for funds to carry on its work. Every proper agency in Oregon should keep before Oregon's congressional delegation the desirability of properly financing the Forest Service. The State has a very direct interest in the 13,000,000 acres of National Forest land within its limits. Every stick of timber on this land will be manufactured within the State and all the wealth resulting from converting standing timber into manufactured lumber will be circulated through the arteries of trade within the State.

The State and the Forest.

Every citizen in the State is vitally interested in the timber and timber land within its borders. Possessing the largest amount of timber of any State in the Union, and forming a part of the only region in the United States still having a

PATROLMEN'S TRAIL IN THE BIG TIMBER—WESTERN OREGON

large quantity of the original stand of timber, every economic indication is that there will be a great development in the State's lumber industry in the near future. This development will be permanent or temporary in proportion as the State handles wisely or foolishly our forest problems. If, after logging, lands are properly cleaned up by slash burning and otherwise, and fire thereafter kept out, a new forest will be established by natural seeding within a comparatively brief period on the greater part of the area west of the Cascade mountains. If this plan is consistently followed, successive crops of timber will be established and mature timber will be ready for the woodsman's ax when the present supply is exhausted. This policy will mean not only a permanent lumber industry, but many permanent secondary wood-using industries and permanence of the other lines of business which have grown up and which will permanently be a source of tax revenue, thus contributing materially to all forms of State and county activity.

It is believed that the State, in addition to lending added assistance in forest protection, should actually enter the field of growing timber. With immunity from taxes, with full power to protect its property, and with the opportunity of borrowing money at a low rate of interest, the State can show a profit in growing timber where private interests might fail. Assuming, too, that private interests should be encouraged to hold certain lands for second crops of timber, it becomes increasingly important that the State should take the leadership in this enterprise. At present, land excellently adapted to reforestation may be secured at a nominal cost. State activities in reforestation should begin with such lands. A carefully worked out plan by which the State could accept in trust from public-spirited citizens land well suited to growing forest crops, with option to purchase, retaining when the timber is sold a large part of the returns but paying the owner a certain equity in such returns, is well worthy of careful thought and consideration by the people of the State.

Similarly, in addition to assistance in forest protection, there should be a modification of the present system of taxing privately-owned forest land to lend encouragement to owners to reforest their lands and to hold them for a second timber crop. The present general property tax, which would levy a charge each year against a crop which, in the Douglas fir region requires from sixty to eighty years to mature, would impose a tax burden so heavy that the investment would hardly prove attractive to the ordinary individual.

In view of the foregoing considerations, with a full realization of the vital importance of the forests and of forest products to the economic welfare of the people of the United States and especially to the people of Oregon, the State Board of

Forestry has approved certain fundamental principles as indicative of its proper field of activity in assisting in solving National and State forest problems, to the end that forest industries may be perpetuated and extended and that the people of the United States and of this State may for all time have timber supplies adequate for their needs. In adopting these principles the Board of Forestry realizes fully that proper action to make these principles effective will result only with a full understanding of them by the citizens of the State. For the sake of convenience, these principles of forest policy are segregated into three divisions: Federal Activities, Federal and State Cooperation, and State Activities.

FEDERAL ACTIVITIES

Granting that the maintenance of a perpetual supply of timber adequate in amount to satisfy the needs of all the people of the United States is largely a national problem, it is evident that the whole country is interested in proper forest utilization, protection, and production in all the states. As one of the states, Oregon has a direct interest in seeing to it that Federal aid is granted in proportion to the importance of the forests and forest lands of the State.

1. The National Forests Should Be Perpetuated.

The State Board of Forestry recognizes the desirability of maintaining the present National Forests under Federal control, and believes in the blocking out of existing Federal forest areas, by purchase or otherwise, of absolute forest land in the interest of more efficient and economical management of existing forests.

The National Forests are administered wholly at Government expense and must by law annually return 25 per cent of the gross returns from such forests to the State. An additional 10 per cent goes for roads or trails in or adjacent to such forests. It is true that a large area in Oregon is not on the tax roll as a result of the Government's national forest policy, and also that present returns from National forests fall far short of what the lands would return in the form of taxes if they were privately owned. It is reasonable to assume, however, that, with the demand for lumber turning in a greater and greater degree to the Pacific Northwest, the State will soon secure substantial revenue from National forests and that under proper management such returns will be sustained from year to year. When that time comes, the forests under Federal control will be contributing more of their gross income to the State than any private business could possibly pay in the form of taxes.

The Federal Government is in effect practicing forest management on lands within the State, under a plan whereby

Oregon participates in the returns from such lands. Had the Government desired to come into Oregon and purchase cut-over land on the same basis of future returns to the State as is now in effect on National Forest areas, it is reasonable to suppose that the plan would have been approved by the people of the State. This would have been recognized as a means of keeping in continued production mountain lands and other absolute forest lands considered of little value once the timber is removed. No private enterprise could hope to manage such cut-over lands profitably enough to justify paying to the State 35 per cent of the gross income in the form of a tax.

It is true that vast sums would have been paid the State as taxes on Federal forest lands had they gone into private ownership and that, from time to time, there has been some annoyance due to Federal regulations and requirements. An understanding by the people of the State of the administrative methods of the Forest Service and a comprehension by the service of the needs of the State, have largely eliminated opposition to the National Forests and National Forest policies. This is especially true of the great stock-growing industry of eastern Oregon. The stockmen use the forest lands extensively for grazing purposes. Their organizations are on record as indorsing the Federal Forest Service and its policies. The near future gives promise of added financial help to the State from the National Forest areas. It is conceded that the National Forests have come to stay. The part of wisdom is to accept them and to try to make them profitable alike to the Government and to the State.

At present receipts from National Forests return to the State some $100,000 annually. An appropriation for roads in or partly within the National Forests has given Oregon about $300,000 each of the past two years. This, and other proposed legislation, shows clearly that the Federal Government recognizes fully its obligation to reimburse the State for funds lost to it by maintaining the National Forests under government control.

Efficient management of the National Forests demands a thorough blocking out of National Forest areas. Those forests having within their borders the largest areas of privately owned land are now most expensive to administer. It is also more expensive for the State to administer its fire protection laws on these scattered, privately-owned areas than it is upon solid blocks of forest land. With this understanding, there should be no objection to the exchange of Government land for that in private ownership, or to the acquisition by the Government of additional absolute forest land in or adjacent to existing forests.

STATE PATROLMAN WITH EQUIPMENT

2. Reforestation of National Forest Lands.

Congress should make adequate appropriations to insure reasonably rapid forest replacement on all denuded National Forest land.

National Forest timber is being cut as rapidly as the lumber industry can absorb it. On the bulk of the lands now being cut over within the National Forests, a new crop is assured through proper handling of such cutting. This, in both eastern and western Oregon, is largely a matter of proper slash disposal. There are, however, considerable areas which, as a result of repeated fires, now bear no young tree growth of value. Such areas must, in the interest of the Government and State alike, be reforested artificially. So far, Congress has failed to appropriate necessary funds for this work. What has been done is little more than experimental. The last Congress reduced rather than increased the funds for reforestation. The longer work of this character is delayed the greater will be the interval before these lands can contribute from their product to the State and to the timber supply of the State and Nation.

3. Protection from Fire and Insects.

Congress should make appropriations sufficient in amount adequately to protect all National Forest areas from fire and insect depredations.

First of importance in all National Forest work is forest protection. Mature timber and that partially mature must be safeguarded. When burned or killed by insects, possibilities of revenue largely cease. Congress has never failed to provide funds with which to fight fire. Such funds, however, have often been in the shape of deficiency appropriations. What is not recognized by Congress, but is recognized by the State Board of Forestry, by private owners, and the Forest Service, is that economy in the long run results from providing an adequate force to prevent fire. This may mean slightly greater expense than absolutely necessary during favorable years, but it means less expense during bad years. The important thing is that it means smaller losses of valuable timber. Enormous protection expenses do not result from maintaining an adequate prevention force, but through the necessity of an excessive amount of fire fighting. A request for an emergency appropriation is similar to a riot call in an inadequately policed city. The aim should be, in so far as this is possible, to prevent need for fighting large fires which not only entail great expense, but also result in timber losses often aggregating millions. The saneness of recognizing that adequate prevention forces be maintained on National Forests should be brought to the attention of Congress. The fact that National Forest areas join or are intermingled with the lands of the State adds to the Nation's responsibility in this particular subject.

Another phase of protection, assuming importance in certain sections is the control of insect depredations. While Congress has recognized the loss resulting from forest insect infestations, Federal funds for this work have always been far from adequate. Insects are now doing damage computed in hundreds of thousands of dollars, on lands inside and outside National Forests. Insect control, to be successful, must be extensively carried on or it becomes a waste of funds. Partial cleaning up of an area is not effective. The need for providing funds both by private owners and by the Government, so that this work may be properly handled, is obvious.

4. A Nation-wide Forest Inventory Necessary.

The Federal Government should provide for a comprehensive inventory of the forest resources and absolute forest lands, including:

(a) The total supply of merchantable timber.

(b) The total acreage of immature timber, with the approximate time of its maturity and the estimated yield at maturity.

(c) The total amount of forest land now unproductive.

It is believed essential and sound from a business standpoint that the Nation have an official stock taking of forest resources, to determine where we stand with regard to available timber supplies; what areas give promise of future production if protected; how soon crops on these areas will be available; and the extent of areas not now restocking and which require special treatment to bring them to a state of production. Data now available covering the items above enumerated are decidedly inadequate. The information is little better than a guess.

Each state should be able to figure out what percentage of its area must be kept in forest to supply home markets, and what additional area can well be kept in timber crop to support its lumber industries and to supply outside demand. The Federal Government should have accurate data from which to compute the area in the different sections of the country which should be kept in forest crop to safeguard the future needs of all the States, and it should also be known how nearly present areas of young growth will supply this future demand. In other words, each state for itself and the Nation for all the states should be able to arrive at a minimum area to be kept in forest growth, below which minimum it would be unsafe to go.

The Federal Government, in cooperation with the State, should provide for an examination of all lands concerning which there may be a question of their agricultural value. Lands of present or potential agricultural value should be so designated. Such classification would be of immense value to the State as a basis for considering extension of National

Forest areas, in making exchanges of State and Government lands and in acquisition by the State, when the time arrives, of denuded forests to be held as State forests. This land classification would also be of immense economic value to the states in considering programs for clearing logged-off lands for agricultural purposes.

5. Investigative Work Necessary.

The Federal Government should not only continue but should extend its experimental work looking to better utilization and handling of forest products. Field experiment stations should also be maintained throughout the west as a means of studying fire, grazing, reforestation, and other problems.

The laboratory at Madison, Wisconsin, maintained by the Forest Service, is the only place in the United States where wood uses and proper handling of wood is being studied. During the war, this laboratory was of the greatest assistance to the War Department in connection with the air service program and in other directions. The laboratory has been of great value to the lumber industry and the consuming public alike, as well as aiding the conservation of wood products in the interest of the entire Nation.

Local problems, such as fire prevention, reforestation, effect of grazing on forest lands, control of insects, etc., should be studied through establishment of field experiment stations. Many of these problems must be worked out in an intensive way and just as experiment stations have proven of inestimable value to agricultural interests so it is believed forest experiment stations will prove of great benefit to the forest industry and the general public. Oregon's interest in this whole question is great because of the immensity of the timber resources of the State.

FEDERAL AND STATE COOPERATION

From the very nature of the forest problem there are many points at which National Forest interests and the interests of the State, as representing private timber owners, are closely related. In all cases where this is true, it is to the advantage of the Nation and the State that there be the fullest possible cooperation. The State Board of Forestry, in the interest of the people of the State of Oregon, will do all in its power to bring about full and effective cooperation with the Federal Forest Service along the lines indicated in the following paragraphs:

1. Cooperative Federal and State Fire Protection.

Since forests are a national asset and as such contribute to the welfare of all the people, Federal appropriations should be made adequate in amount to prevent and control forest fires outside the National Forests. Such appropriations should be met by equal expenditures within the State.

TYPES OF LOOKOUTS' AND PATROLMEN'S CABINS

The Government has long recognized the fact that, under present economic conditions, the growing of forests for future timber supplies is an uncertain financial venture for private enterprise. The first recognition of this came with the creation of the National Forests. In some states, this governmental action was followed by the establishment of State forests, in others by laws aimed at safeguarding timber. All of these things have been good, but the Nation has not yet reached the point where an adequate timber supply for the future is assured. To establish this assurance will require a great extension of National and State forests, or else it will require the enactment of laws which will make it possible for private enterprise to enter the field of forest production. A great deal remains to be done before private capital can see in forest growing a profitable investment. In the meantime, lands restocking, young growth and mature timber, should be protected in every feasible way. There is the added reason for forest fire prevention in that forest fires annually destroy property of ranchers and settlers to the amount of thousands of dollars as well as taking an annual toll of human life.

The Nation is interested in having for all time a plentiful supply of reasonably cheap timber. This means that the present forest growth, both young and old, must be protected. Such protection can not be logically borne in its entirety by the Federal Government alone, by the State alone, or by private owners. All are directly interested and consequently all should help bear the cost. Were merchantable timber in private ownership alone involved, then the question of financial responsibility would be simple, but when the problem is one of protection of cut-over and burned-over areas which are potential forest lands, and which have varied ownerships, the need for Government and State cooperation in protecting such areas is obvious.

2. Classification of Forest and Agricultural Lands.

Funds should be allotted jointly by the Federal Government and the State for the classification of forest land now outside National Forests in order that no land better suited to agriculture than to forestry may be devoted to forest purposes.

Land classification should go hand in hand with a census of our forest resources. Need for such a classification hardly requires argument. Oregon should know, and the Government should know, what lands within the State are best adapted to growing forest crops and which eventually will be so utilized. But this work should be done by State and Government jointly in order that the data collected may be the basis for future State or Government acquisition of land and for State and Government cooperation in protection of land in other than public ownership.

No forester desires to grow commercial timber crops on land which, in the long run, will yield a greater net return if put under cultivation. On the other hand, no one should want to till soil which will eventually yield more if devoted to timber production. Thousands of people in the Pacific Northwest have given years of the hardest kind of toil trying to clear and cultivate land which, because of its steep slopes, its shallow soil, or because of its situation in a region of scant rainfall, never should have been put under cultivation. Misdirected and unproductive human effort is an economic loss both to the State and to the Nation. Both the State and the Nation have a responsibility for seeing to it that their citizens do not wreck their lives or waste their energies in tilling lands which under present conditions should be growing forest crops.

3. Land Exchange.

To facilitate management on the part of all interested agencies, there should be in operation a policy of land and stumpage exchange on the basis of equal values, between the Federal Forest Service, the State of Oregon, and private owners.

If private owners, the State, and the Federal Government are to be in the field of forest growing, cases will arise where exchanges of land are desirable. It would be greatly to the advantage of the Government, the State, and private owners alike, if exchanges of land could easily and quickly be made, and this on a basis of equal values. At present, exchanges of land between the State and the Government can only be made under an old law which provides a means by which states may select lands in Government ownership, outside National Forests, and trade them for school sections located within such forests. Many unnecessary steps are involved in making transfers under this law. A general exchange law should be enacted to provide for blocking out of Government, State and private lands. Numerous bills with this end in view have been introduced in Congress, but none of them have so far become law.

4. Trees for Forest Planting.

The Federal Government and the State should provide a plan of cooperation through which forest nursery stock may be supplied to farmers, municipalities, and other land owners at cost of production.

Many ranchers and some timber land owners will eventually desire to plant trees, the former to secure material for farm purposes, the latter to fill in fall-spots on areas being held for a second crop. In the public interest, planting should be encouraged as a means, though a minor one, for providing future supplies of timber. To aid in this project, forest nursery stock should be supplied at a minimum of expense. Since the Federal Forest Service now maintains nurseries in various parts of the west, and since their capacity can be increased

to meet additional demands, it seems inadvisable for Oregon to establish nurseries for growing tree stock as some other states, notably New York, have done. Better results at less expense can be secured through cooperation with the Federal Government.

Considerable public interest has recently been aroused in the matter of preserving the scenic beauty of the State's highways. This is a project which may require nursery stock for highway planting. As this is in the interest of all the people, cheap stock should be available, but, of course, trees should not be furnished for ornamental purposes. The business of growing such trees is already taken care of through private nurseries with which the State should not compete.

STATE ACTIVITIES

Aside from the forestry field which is decidedly federal in character and the field in which the Federal Government and the State cooperate, there is a province belonging distinctly to the State. Oregon, eventually, as a matter of State pride as well as of State interest, will want to participate extensively in the business of growing timber crops. This means that the State will some day acquire title to a considerable area of lands suited only to the growing of forest crops and will replace forests upon them. The state will desire to continue the exercise of its proper police power in preventing and controlling forest fires on State and private lands. Oregon will, as a matter of sound State policy, enact and administer laws tending to develop and perpetuate its great lumber industry. In the accomplishment of these ends the State Board of Forestry believes it can be of service by endeavoring to achieve the things indicated in the following pages.

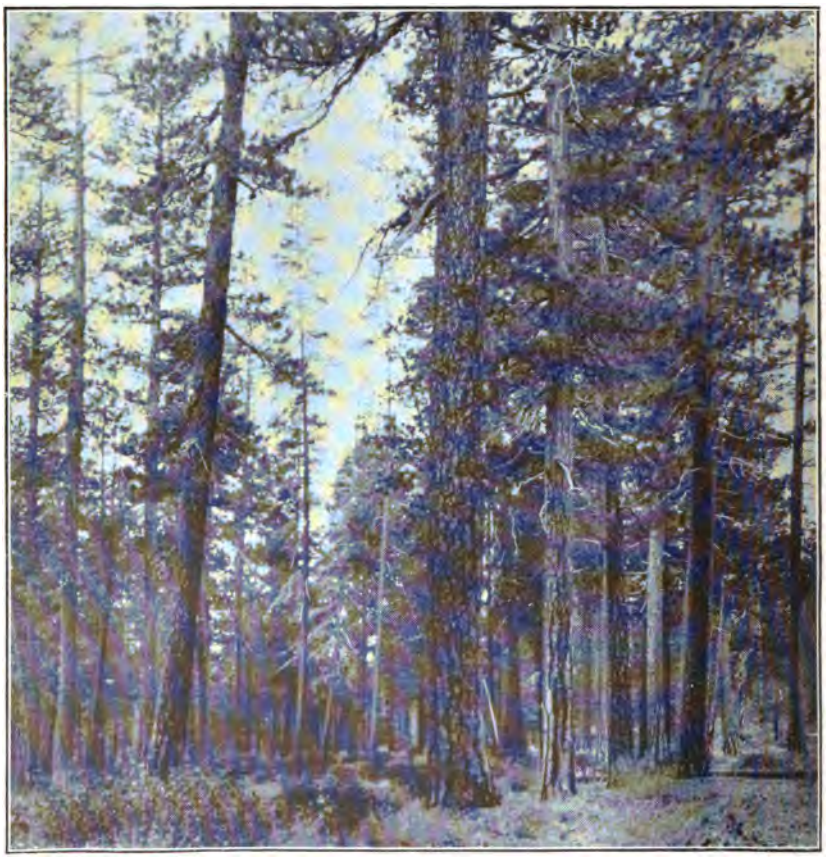
1. Adequate Fire Prevention Imperative.

Such legislation should be enacted as will make possible, through cooperation with the Federal Government and by direct State action, that degree of fire prevention and control which will stabilize forest properties so that they will become an insurable risk. The State Board of Forestry regards fire prevention and control of fundamental importance in any forestry program for this State. Fire protection should be extended to all potential forest land as well as those lands now carrying mature or immature timber crops.

It is the duty of the State so to manage its natural resources that they will contribute to the prosperity and happiness of its citizens in the greatest degree and for the longest possible time. The forests of Oregon constitute one of the State's richest natural endowments. It is estimated that a sum greater than $75,000,000 annually circulates through the arteries of trade in the State on account of the lumber industry. Fire is

by far the greatest menace to the existing timber supply and to young growth, which is the basis of the future forests and of the future lumber industry. Prevention and control of fires insure forests for the future. Forest fires can be controlled. The experience of countries which have practiced forestry for hundreds of years is sufficient proof of this statement. It is the plain duty of the State to make adequate provision for controlling them.

By controlling slash burning at the proper season of the year satisfactory natural reproduction will follow logging in the greater portion of the territory west of the Cascades. Expert foresters, through investigations covering a series of years, have demonstrated that there is enough seed stored in the soil and debris of the forest floor to produce an ample



CHARACTERISTIC STAND OF WESTERN YELLOW PINE

young stand of trees if the slash is burned in the spring, immediately after logging. The thing to do is to burn at that time and to keep the fire out thereafter. If this is done a future forest is assured. At the same time the land, with each year, acquires higher values because of the increasing size of the young trees it carries. This is a matter which should receive careful consideration by timber owners who are logging their lands. The values existing in young growth are clearly recognized by the Forest Service, and by the State Board of Forestry. Private owners who do not desire to hold their lands for a second crop will be able to realize on these accumulated values when the Federal Government or the State takes over the lands. It may be taken as an economic certainty that all absolute forest lands will ultimately be put to growing timber crops. It should be repeated with emphasis that it is the duty of the State to control the burning of slash on cut-over lands, and to see to it that subsequent fires are kept out of such areas.

2. Acquisition of a State Forest.

The State of Oregon should enter on a program of acquisition, by purchase, gift, bequest, or acceptance in trust, of logged-off, or other absolute forest land.

Thousands of acres of logged-off lands, suited only to producing timber crops, are now lying unproductive, a burden to the owners, because of this condition, and a source of little tax revenue to the State because of their evident low value. Under present economic conditions, and because of a lack of understanding of forestry methods as well, owners of logged-off lands do not feel justified in making such investments as will insure a stand of timber on these lands. A responsibility rests upon the State to put these unproductive acres at work in order that their product may carry on the lumber industry of another generation when the present stand of timber has vanished before the ax and saw.

A well thought out program of acquisition and reforestation of cut-over and otherwise denuded lands should be developed. This policy should be stabilized by appropriate legislation. The program should be made to harmonize with Federal activities along the same line, but should be on a scale which will insure bringing all absolute nonforested lands under forest within a period of approximately forty years. As a part of the general program of reforestation, it is believed that a plan can be devised which will prove sufficiently attractive to owners of large areas of logged-off land that they will desire to create estates for their descendants by conveying these lands in trust to the State for reforestation purposes. Costs to the State for actual expenditures, for interest, and for risk, could be made to constitute a lien upon the property, to be satisfied at the time of the harvesting of the timber crop. It is highly

gratifying that a considerable body of opinion within the State is favorable to this type of legislation. It is significant that one strong, forward-looking organization, at two recent State conventions, has indorsed the policy of the acquisition by the State of logged-off lands for the purpose of creating a State forest.

3. The People Should Know.

The State Board of Forestry is committed to an aggressive campaign of education, by publications, lectures, demonstrations, and otherwise, to the end that the people of the State may be fully informed concerning the value and extent of its forest resources, the damage done to immature and mature forests by fire, together with the means which should be employed to bring about the full and continued utilization of forest lands within the State, and to insure the full protection and wise use of the State's existing timber supplies.

In the last analysis, in matters within the province of the State Government, the people of the State decide what policies shall be adopted, and what lines of action can follow only after the electorate is possessed of full information. When the people of the State know the extent and value of its forest resources, when they are advised concerning the amount of damage done to standing timber and young growth by forest fires, when they are impressed with the economic advantages to the State of adequate fire prevention and control, and when they have had demonstrated to them the feasibility of replacing forests on cut-over lands, then the future of the forest industry in Oregon is assured. It is the duty of the State Board of Forestry to see to it that this information is placed in the hands of the present voters and of the children, the future rulers of the State.

4. Forest Insect Investigations.

Systematic and continued investigations of insect depredations should be provided for, in order that feasible means may be discovered for minimizing timber losses through this agency.

The problem of controlling the attacks of forest insects has not been solved. Its solution is a matter of vital importance to the timber owner of certain sections of the State. Economically, the problem is of importance to the entire State. Funds should be provided, commensurate with the property interests involved, so that field experiment stations may be established and experts employed properly to carry on the investigative work of forest insect control. Timber destroyed by fire is an economic loss to the commonwealth. The economic importance of the problem of forest insect control appears when it is stated that, in the opinion of certain forest entomologists, as much timber has been destroyed by forest insects as has been rendered valueless by forest fires.

5. Taxation of Forest Properties.

There should be a careful consideration by competent authority of the whole question of the taxation of those forest lands devoted to the reproduction of forest crops, and of forest crops during the period between establishment and maturity.

It is an economic axiom that income establishes values and that taxes should be levied at the time incomes are received. Forest crops differ from other crops in that they mature only at long intervals. These intervals vary from fifty to one hundred years or more from seeding time. Obviously, to tax the timber producer annually on a value established by a prospective income, due fifty years or more in the future, places him at a decided economic disadvantage with the producer of other crops which mature and are harvested in one season. On the other hand, it is evident that the sudden removal of large tracts of land from the tax roll would place communities at a disadvantage in the maintenance and development of their proper public activities and projects.

To deal justly with those political units which have planned their future development upon the tax income from the properties within their limits, and to devise a tax system for timber producers which will defer the major portion of the tax until the time of the receipt of income, will require a careful investigation and study by men especially fitted for the task. This task must be accomplished, however, if private enterprise is to play the part it should in the great program of keeping Oregon acres growing the crops they are best fitted by nature to produce.

6. Promotion of Forest Planting.

There should be a definite program of assistance to woodlot owners and to those who desire to establish forest plantations for farm use, for commercial timber production, or for beautifying the public highways.

The farmer's woodlot is no insignificant factor in the Nation's timber supply. The farmers of the east have learned the woodlot's value. The ranchers of this State should know the possibilities which lie within a few acres devoted to timber production before it is too late. As an emergency fuel reserve, the woodlots of the Nation demonstrated their value during the coal shortage of the recent war. It is a proper function of the State to give advice to farmers relative to the management of these little forests. In much of western Oregon, simple methods of management will result in keeping these properties up to their maximum degree of productiveness. The State would also be justified in supplying, at cost, forest nursery stock to those who desire to increase the productiveness of present woodlots by planting trees better suited to the various localities or to those who wish to establish new plantations.

7. Municipal Forests.

The State should extend every reasonable encouragement and advice in the establishment of municipal forests for the protection of watersheds valuable to towns and cities in maintaining their water supply.

Many Oregon cities derive their supply of water for domestic use from forested areas. In the majority of cases, this land is privately owned. In many instances, private owners are cutting the timber and as a result the quality of the water is impaired and the efficiency of the watershed is reduced by the lessened stream flow during the dry season, the period of greatest need. The Federal Government has recognized the value of a forest cover on a city watershed, notably in the case of Portland. Bull Run water has acquired fame throughout the Nation. In a lesser degree, the Government has assisted cities in maintaining a forest cover on the areas from which this water is obtained in the cases of Dallas, Corvallis, and McMinnville, where tracts of government lands have been set aside for municipal purposes. These are small beginnings. Before it is too late, Oregon cities having possibilities of securing water supplies from forested areas should be fully impressed with the desirability of safeguarding those tracts by purchase. They should be advised by the office of the State Forester, or by the School of Forestry at the Oregon Agricultural College, or both, relative to the areas required and the methods of management after acquisition. A general State law, giving cities the right to condemn and purchase lands needed for watershed purposes, should be enacted. European cities derive revenues from their municipal forests far in excess of the costs of management. In addition, they have the benefits coming from a safeguarded water supply. Certain Oregon cities should own and manage forests on their watersheds. Every year of delay means an added cost when the property is finally acquired.

OREGON'S FORESTRY LAWS

A Brief Summary

The forestry laws of Oregon are under the general administration of the State Board of Forestry. The Governor of the State and the head of the School of Forestry of the State Agricultural College are, ex officio, members of the board. Five additional members are appointed by the Governor, one each upon the recommendation of the following: The Oregon State Grange, the Oregon Forest Fire Association, the West Coast Lumberman's Association, the United States Forest Service, and the Oregon Woolgrowers' Association. The board is absolutely nonpartisan in character.

The State Board of Forestry appoints a State Forester, who has immediate charge of carrying out the provisions of the state forestry law. The State Forester's office is in the Capitol at Salem.

The State Forester, acting under the general policies approved by the State Board of Forestry, has the following duties: He appoints fire wardens, and supervises their work; collects information relative to forest conditions; enforces the law relative to preventing and fighting forest fires; prosecutes violators of the forestry law; cooperates with landowners in forest protection; advises and encourages reforestation; designates fire protection districts; and indicates areas of forest insect infestation.

Slash resulting from the cutting of timber is, by law, a public nuisance, and must be properly burned during the year following cutting. If an owner refuses to burn his slash the State Forester is empowered to burn it and to charge the cost of the work to the owner.

State fire wardens have the authority to arrest for violations of the forest law. A fire warden who fails to carry out his legal duties may be fined or imprisoned, or both.

Able-bodied men must aid in suppressing forest fires when called upon by a State Fire Warden to do so.

June 1 to October 1 is designated by law as a closed fire season. During this period areas covered with slash or brush may not be burned over unless a permit for burning has been given by a fire warden. Violations of this regulation are punishable by fine or imprisonment, or both.

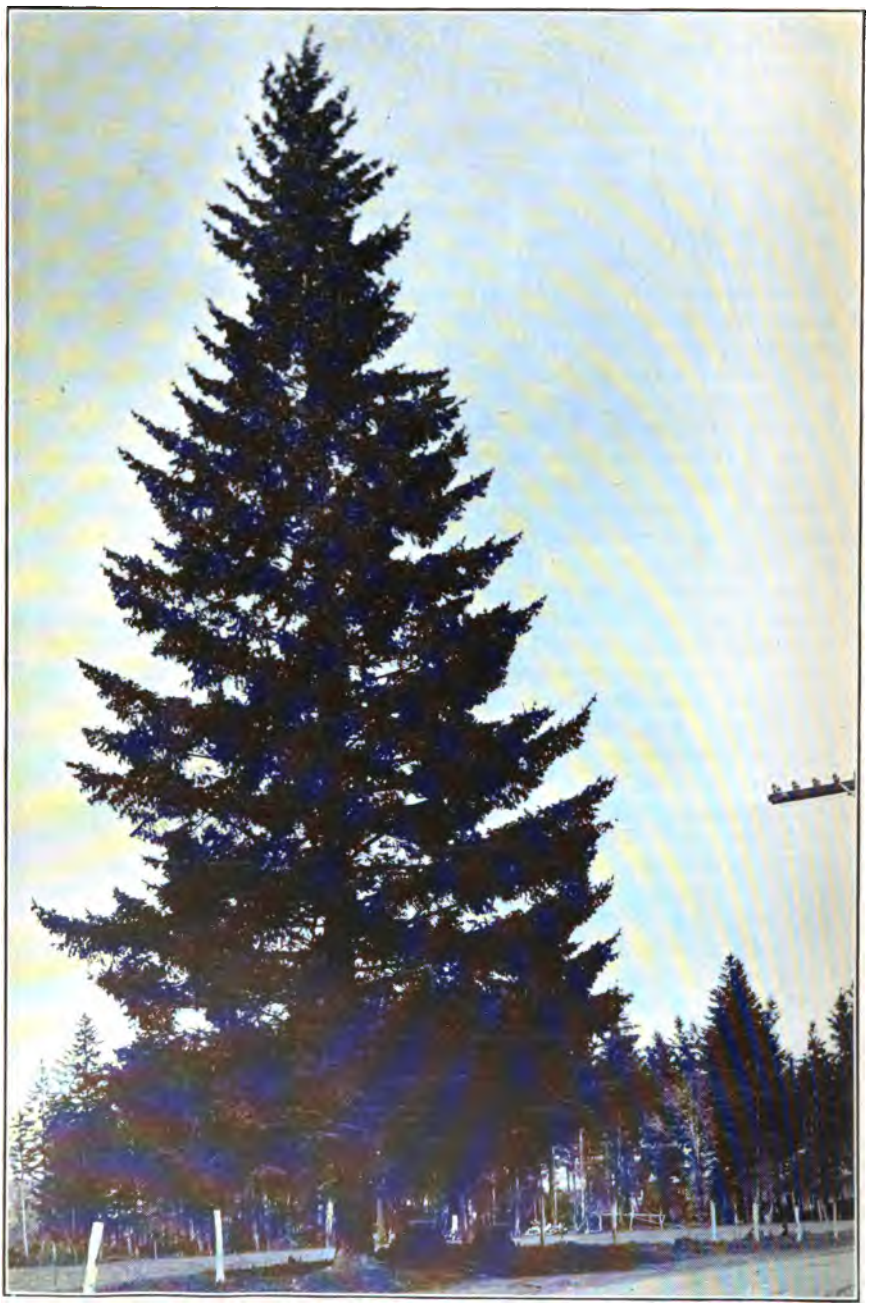
One may be fined or imprisoned for setting fire on the land of another, or letting fire escape, wilfully, or accidentally, from his land to that of another.

It is unlawful to leave a camp fire burning, or to make a camp fire without first clearing the ground about it of inflammable debris. Violation of this provision is punishable by fine or imprisonment.

Forest or brush fires burning without supervision are, by law, a public nuisance. Persons responsible for such fires are required to make reasonable efforts to put them out. If they fail to do this, State Forest officers may do the necessary work and charge the cost against the responsible persons. Such charges constitute a lien upon the property involved.

During the closed fire season all engines using fuel other than oil and operating in or near forest or brush land must be equipped with effective spark arresters.

Setting out fire, in forest or brush, with the intent of destroying the property of another, is a penitentiary offense. Double the amount of damage suffered may be recovered by the injured party.



TYPICAL OPEN-GROWN DOUGLAS FIR

The destruction of notices posted under authority of the State Board of Forestry is an offense punishable by fine or imprisonment, or both.

Every owner of timberland must provide sufficient fire patrol for it during the fire dangerous season. Such patrol must be approved by the State Board of Forestry. If the owner fails to provide such patrol the State Forester shall provide it and shall charge the cost to the owner of the land, such charge becoming a lien upon the property, to be collected in the same manner as taxes are collected.

If the owner of timberland resides within one and one-half miles of his property, such residence is construed to be satisfactory fire patrol, and he is not required to maintain an additional patrol on his land.

County judges are, ex officio, fire wardens and may issue or revoke burning permits during the fire dangerous season.

Every person having a burning permit must, at least twenty-four hours before burning, give notice to each resident owner of adjoining land of the time when he intends to burn.

Forest insects harmful to standing timber are, by law, a public nuisance. Sixty per cent or more of the owners of timberland in a region infested by forest insects may ask the State Forester to have the infested area designated as an infestation district, and to take the necessary steps to eradicate the insect pests. Owners refusing to cooperate in this work shall have a proportionate part of the cost charged against their property. Failure on the part of any owner promptly to pay this charge shall result in the sale of the property by due process of law and a sufficient amount of the proceeds shall be appropriated to cover the cost of the insect eradication work.

For a complete copy of the State Forest law, or for an interpretation of any part of the law, write the State Forester, Salem, Oregon.

FOREST FACTS

The original forested area of the United States is estimated to have been 822,000,000 acres. This area has been reduced to 463,000,000 acres. A considerable part of this remaining acreage has been culled of its best timber.

The original saw timber stand of the United States has been estimated at not less than 4,200 billion board feet. This has been reduced to about 2,215 billion board feet, approximately 40 per cent of the original stand.

About three-fourths of the total present stand of timber, including the best and most accessible, is in private ownership. Less than one-fourth is included in the National Forests. The remainder, about 3 per cent, is owned by states and municipalities.

The average consumption of saw timber in the United States is approximately 40 billion board feet. If this rate continues our present stand will be exhausted in about 50 years.

The people of the United States are using their timber four times as fast as growth replaces it. European countries cut no more each year than they grow. In the United States there is an ample area of land, good for nothing except to grow trees, to produce all the timber we need for all purposes, for all time. The unproductive part of this area should be put to work and kept at work growing trees.

Oregon has 493,700 million feet of saw timber. This is more than one-fifth of the remaining stand in the United States.

Douglas fir is the most valuable timber tree in the United States. In Washington and Oregon this tree makes up 505 billion feet of the total stand, or nearly one-fourth of the remaining timber in the whole country.

The present value of Oregon's standing timber exceeds $450,000,000. The manufacturing industries of Oregon employ approximately 71,000 workers. Of these nearly 30,000 are engaged in the timber industry. No other manufacturing industry employs one-tenth as many.

The annual pay roll of Oregon's lumber industry exceeds $30,000,000. It distributes more wealth in the State than the apple, fish, wool, and wheat industries combined.

Forest industries and standing timber pay about one-third of the taxes in Oregon. In some counties timber pays as high as 75 per cent of the taxes, and in others over 50 per cent.

An average acre of Douglas fir land in western Oregon will produce 41,000 feet of saw timber in 60 years. In terms of fuel it will grow over 100 stacked cords of wood in the same period.

In favorable locations Douglas fir stumpage has sold for $4.00 per thousand feet. In New England, white pine stumpage has sold for $20.00 per thousand feet. Thirty years ago the best white pine could be bought for a lot less than $4.00 per thousand. What will be the price of Douglas fir stumpage thirty years hence?

Forest experts estimate that a thousand feet of saw timber can be grown in western Oregon on land seeded by nature for not more than $7.00. Nonagricultural lands covered by second-growth have a decided future value.

Fire is the great enemy of second-growth. In the United States there are 240,000,000 acres of cut-over land. Fire burns over from 8 to 10 million acres of this land annually. Oregon contributes its share in this needless destruction.

OUR FORESTRY PROBLEM

"We are cutting our timber probably four times as fast as timber is being grown. It is useless to decry the generous use which American industry has made of our forests. It has contributed powerfully to the industrial development and commercial supremacy of the United States. The forestry problem does not result from the liberal use of our forests, but from our failure to use our forest-growing lands. There is an ample area of land in this country, which is not tillable, to support all of our timber requirements, all of our wood manufactures, all of our home building and agricultural use of timber, indeed an even larger export trade than at present, if that land can be kept at work growing timber. Reforestation has become a commercial necessity of the United States."

COL. W. B. GREELEY, *Forester.*